

Measuring, Protecting and Spreading the Knowledge About Underground Cultural Heritage with the Usage of Modern Technologies

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SUMMARY

Cultural Heritage understood more broadly as both tangible and intangible heritage, is recognized by the international community as a pro-development factor of increasing importance for modern societies. Nowadays, an increased interest in searching for new concepts and solutions for the protection and management of Cultural Heritage can be seen all over the world. The question of why and how to protect cultural heritage in a modern way is becoming more and more frequent. Undoubtedly, underground objects, both of natural and man-made origin, have historical, educational, aesthetic and functional importance. Underground and rock mining has accompanied the development of architecture and construction for centuries. Underground and rock mining has accompanied the development of architecture and construction for centuries. Many underground facilities, mines, products of human activity had a huge impact on the development of humanity, the economy, the development of states, etc. Considering the number and variety of underground facilities, Poland is definitely a unique country. Currently, there are approximately one hundred and eighty underground objects used for tourist purposes in Poland, including several underground mines inscribed on the UNESCO World Heritage List and objects of historical importance.

Geodetic measurements are an integral part of processes of documentation, deformation monitoring, making the facility available for tourism, revitalizing, protecting, creating virtual tours of such historical underground objects, etc. Moreover, allow for a holistic inventory of this type of object, taking into account its special character. The Underground Cultural Heritage - its protection, revitalization, and making it available for tourists is a huge field for interdisciplinary research. Accurate geodetic data can be useful for historians, geophysicists, archaeologists, and geologists. The projects have also proved to be extremely useful in the social sphere for both scientists and museums. Authors, members of the Department of Mining Areas Protection, Geoinformatics and Mining Surveying AGH UST, have been performing such measurements in many places, including

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Wieliczka Salt Mine (The Chapel of St. Kinga is the world's largest underground temple and The Nature Reserve of Crystal Grottoes). Additionally, inventory surveys have been performed in five adits of Riese Complex (Lower Silesia, Poland), in both parts which are available and inaccessible for tourists, Nietoperzowa Cave, Smocza Jama (Wawel Castle in Cracow, Poland).

In this paper, an approach to carrying out a comprehensive geodetic inventory of the above underground historical objects was shown, based on the experience of the authors' measurement team. Laser scanning as a universal and non-contact method in combination with classic geodetic techniques is used in the inventory of both underground mining facilities (mines) and mining facilities related to history. The concept of using VR and AR technology in the protection and dissemination of information about Cultural Heritage is also discussed.

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