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Title: A Unique Medical Imaging Test Laboratory to Be Built in Oulu

Year: 2021

Version: Publisher's version

Please cite the original version:

Paalimäki-Paakki, K., Schroderus-Salo, T. & Nieminen, M. (23.11.2021). A Unique Medical Imaging Test Laboratory to Be Built in Oulu. Smart Campus Insider <https://smartcampus.fi/unique-medical-imaging-test-laboratory/>

## Blog: A Unique Medical Imaging Test Laboratory to Be Built in Oulu

Posted on [November 23, 2021](#)



<b>Edited blog</b>	Smart Campus Insider
<b>Date</b>	23 November 2021
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<b>Keywords</b>	Medical imaging, simulation, radiography, RDI, OUAS

### Abstract

In Smart Campus project, our experts in Oulu University of Applied Sciences' (Oamk) are exploring digital transformation both in competence renewal and in the world of work to define smart services and solutions in specific application areas. We have already developed some smart digital infrastructures and gathered multidisciplinary experience, knowledge and technological competence to vision the future of higher education. Our next extensive endeavour is focused on social and health care. University of Oulu and Oulu University of Applied Sciences are establishing a teaching and testing laboratory for medical imaging. The laboratory is dedicated to teaching, research, development, innovation and testing activities and will strengthen Oulu's position nationally by providing a single infrastructure that serves the needs of research, education and companies in a versatile manner. The laboratory will be located at Oulu University Hospital.

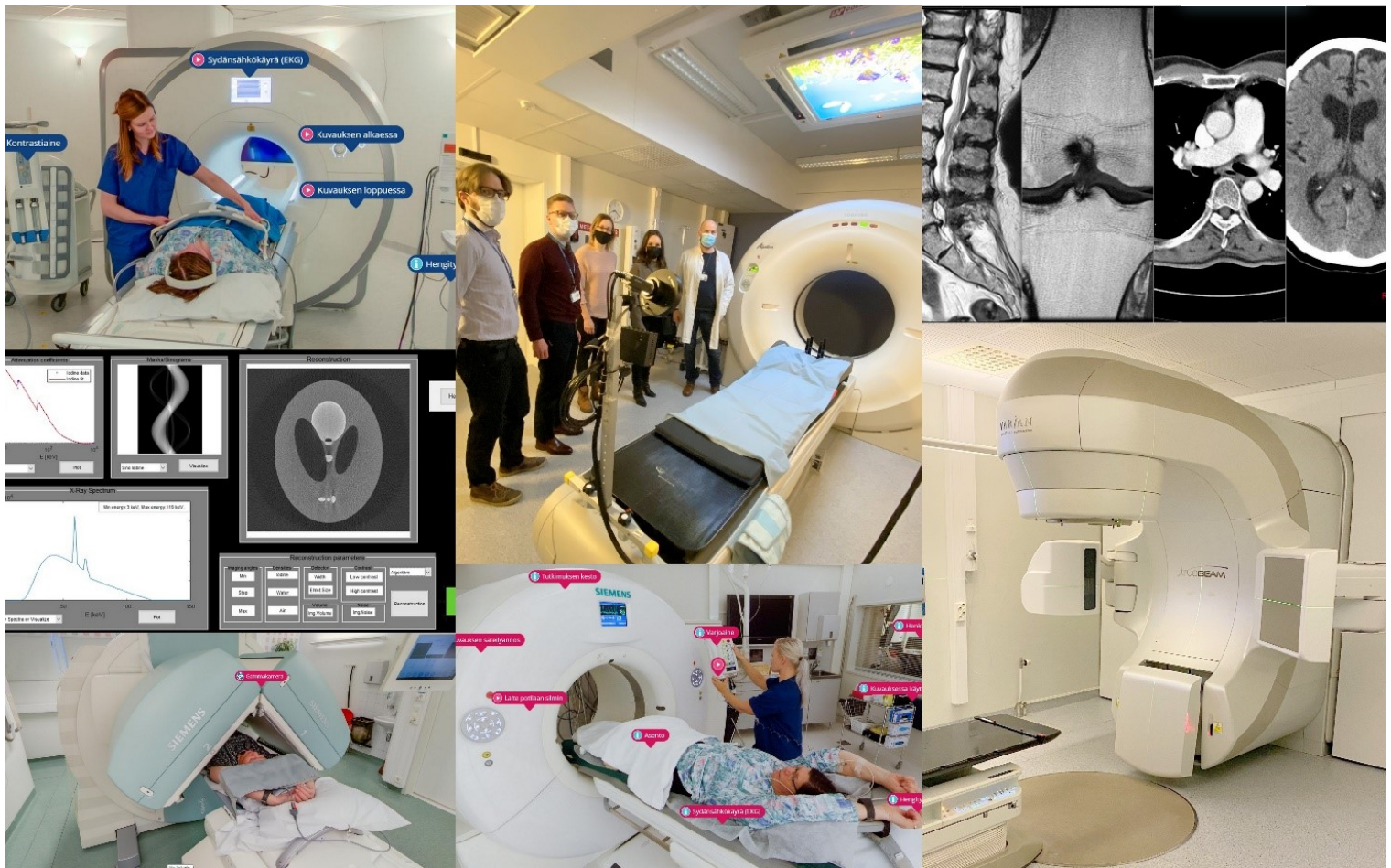


Image 1. The medical imaging laboratory consists of physical and virtual imaging devices. Image: Karoliina Paalimäki-Paakki and Miika Nieminen.

## Various opportunities to simulate, test and train the safe use of medical radiation

The laboratory's physical and virtual equipment will be used in versatile manner to further education in physics, medical technology and radiation protection at the University of Oulu and in the training of radiographers and nurses at the Oulu University of Applied Sciences. The suitability of the test laboratory for teaching, equipment testing, development and innovation will be demonstrated in five pilot projects together with partner companies. Several medical imaging companies need to test new equipment in facilities similar to a hospital environment. The laboratory will enable equipment testing and help to commercialise equipment and prototypes developed in this way.

Laboratory environment offers various opportunities to simulate, test and train the safe use of medical radiation, while utilising diverse imaging methods. The environment consists of digital imaging devices, PACS, electronic medical record system, digital learning materials, 360°-virtual simulation environments and cloud services. Some equipment will be purchased with the funding allocated to the project, whereas some will be donated by Oulu University Hospital as equipment suitable for teaching and research purposes. The most expensive equipment will be brought to the laboratory as virtual simulation environments. Virtual imaging device interfaces will help the students to understand device operation and the underlying physical phenomena behind different imaging modalities.



# 360° virtual environment offers virtual access to the medical imaging unit

Novel 360° virtual environments, based on spherical panoramic images and 360° technology, were developed to resemble authentic spaces that patients encounter on their way to the imaging facilities of the hospital. The purpose was to offer virtual access to the CT, MRI, nuclear medicine and ultrasound unit (together with relevant contextual information) via a convenient link. The 360° environments were produced in co-operation with Visuon using spherical, panoramic digital images acquired at a radiology department of Oulu University Hospital. Authentic spaces were remodelled by spherical 360° images and could be accessed via any smart device with a network connection with no specific applications.

The 360° virtual environment based on spherical panoramic images offers unlimited possibilities to zoom, rotate, view and review different angles of the covered space for as long as each user wants, with no predefined time limits or views. The user interface was designed to be as simple as possible, enabling movement, zooming and rotation of the images by touching the screen, and using connective links as hot spots. Relevant learning materials in text, image, animation and video formats were included.



Image 2. Example of virtual space in the 360° environment, with links to relevant contextual information. Image: Karoliina Paalimäki-Paakki.

The pilot study (Paalimäki-Paakki et al. 2021) aiming to describe patients', radiographers' and radiography students' experiences of the 360° virtual counselling environment (360°VCE) for the coronary computed tomography angiography (cCTA) was conducted. CCTA patients (n = 10), radiographers (n = 10) and radiography students (n = 10) who used the 360°VCE and visited or worked at the Oulu university hospital participated to the study. Data were gathered individually through thematic interviews to understand participants' perspectives and analyzed by inductive content analysis.

The patients described that 360°VCE increased their knowledge, spatial and environmental orientation, feelings of security and self-efficacy before their hospital visit. The 360°VCE also relieved their fear and nervousness. Patients found the counselling materials captivating and that the 360° technology successfully provided reassuring familiarity with the hospital environment.

Both the radiographers and radiography students perceived the benefits of the 360°VCE for both radiography students during their clinical practice and new employees. With the environment, the progress of computed tomography examination, location and patient pathways could be displayed both to the radiography students and students from other health care fields.

*The radiography students can become acquainted with the department, examination room and CT scanner before their computed tomography clinical practice. (Radiography student 2)*

*It is also helpful for others, like nursing students, when they accompany patients to the CT department. (Radiography student 6)*

It seems that patients', radiographers' and radiography students' experiences of 360°VCE are similar to patients' needs by increased knowledge and reduced fears. Thereby current counselling methods, such as written information, can be usefully complemented with spherical panoramic imaging technology and online information delivery.

The University of Oulu's Research Unit of Medical Imaging, Physics and Technology (MIPT) and Oulu University of Applied Sciences have received ERDF funding from the Council of Oulu Region for a two-year teaching and testing laboratory project on medical imaging. The project started in January 2021.

## References

Paalimäki-Paakki, K., Virtanen, M., Henner, A., Nieminen, M.T., Kääriäinen, M. 2021. Patients', radiographers' and radiography students' experiences of 360° virtual counselling environment for the coronary computed tomography angiography: A qualitative study. *Radiography*, volume 27, Issue 2, 381-388, ISSN 1078-8174. DOI: <https://doi.org/10.1016/j.radi.2020.09.019>.



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*Smart Campus Insider* in an edited blog focusing on intriguing topics, project highlights and latest research results of the Smart Campus expert team. The blog writings are original contributions stemming from the latest research, innovation and development work of eight Finnish universities forming the project consortium. Each blog writing has undergone a review process by the editorial board.

Tags: medical imaging, OAMK News, radiography, RDI, simulation

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