

ImageHeadstart .eu

Breakthrough Computer Vision
Applications in the Micro
World: Consortium of Research
Organizations for Industry 4.0

Interreg 
Austria-Czech Republic
European Regional Development Fund

ImageHeadstart news no. 4

The project ImageHeadstart addresses the challenges of digital imaging in the fields of microscopy and tomography. Research on digital imaging techniques such as light microscopy and X-ray tomography at the partner institutions has reached a stage from which many practical applications can unfold. The main goal of the project is to help companies in the Austria-Czech Republic cross-border region to translate this knowledge into new applications and technologies.

The ImageHeadstart consortium will (1) integrate regional companies into the region's research structure, (2) bring together research institutions and regional companies, and (3) support research development in optomechanics, imaging, software development, and Industry 4.0.

To this end, the consortium will (1) organize regular information workshops, (2) create a system to register for bilateral and multilateral consultations, and (3) publish a newsletter on the consortium's technical progress.



Jihočeská univerzita
v Českých Budějovicích
University of South Bohemia
in České Budějovice



Donau-Universität Krems
Universität für Weiterbildung



UNIVERSITY
OF APPLIED SCIENCES
UPPER AUSTRIA
RESEARCH & DEVELOPMENT

Introductory message

ImageHeadstart is a project that gave me some interesting pieces of experience. In July 2021, MUDr. Sekorová and Mr. Spilka from the National Center for Tissues and Cells (NCTB) in Ostrava visited us in Nové Hradý. This visit was so inspiring for both parties that we submitted a joint grant application to the Ministry of Industry and Trade, with the possibility of building a microscope to monitor the quality of the corneas intended for transplantation. At the request of the Ministry of Industry and Trade, our colleagues from the NCTB have already corrected the formal issues in the grant application and are now awaiting the results of the evaluation.

Another nice thing the ImageHeadstart project gave me is a beautiful dark blue costume with a hat. Its undeniable advantage is that I do not have to think long and hard about what to wear for official occasions. It is also nice that in this costume I also celebrate success with the opposite sex. At the International Engineering Fair in Brno (November 2021), the gentlemen confused me with a flight attendant and the gentlemen from the Swiss stand even whistled at me.

We also met and obtained the signature of MVDr. Fejt from the Immunology and Serology Laboratory of the Havlíčkův Brod Hospital for a project report. Dr. Fejt introduced us to working with white blood cells and measuring their activity. We continued our work at our workplace in Nové Hradý and now we have the first results from measuring cell activity using our light microscope. We would like to build a temperable chamber with the GRYF HB company, with whom we also discussed within the project, so that the cells in it also thrive. The result should be a faster and cheaper method for measuring cellular immunity using unlabeled white blood cells. On this topic, we had the opportunity to submit several grant applications. Unfortunately, we did not receive the grants, but during the grant application defense I was able to understand the level of thinking of some senior academic representatives.



*I wish you a pleasant reading.
Ing. Renata Štysová Rychtáriková, Ph.D.*

ImageHeadstart 4D CT demonstrator take a part of Week of Czech Academy of Science

Institute of Theoretical and Applied Mechanics traditionally joins the Week of Czech Academy of Sciences. This promoting action organizes for nearly 20 years is primarily focused on presentation of the newly developed technologies, invents and scientific progress to the general public but this year the part of the program called "4D microtomography - the essential is hidden inside" attracts the the people from companies (e.g. Czech Aerospace Research Centre Ltd, Latecoere Inc). During the guided excursions to X-ray Labs 4D CT demonstrator created as a part of ImageHeadstart helps to clearly explain the benefits of X-ray inspection of loading experiments. As a case studies covering different fields of 4D CT application five A4 posters was distributed. Because of limit space capacity and high interest, the excursion was repeated three times and originally scheduled slot of 45mins was extended to 75mins.





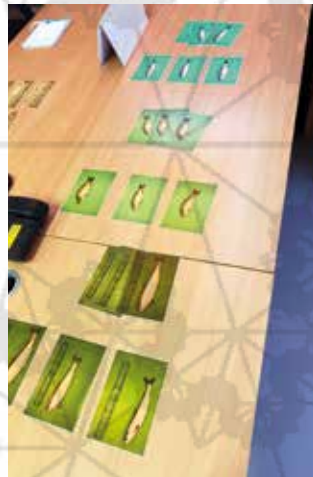
ImageHeadstart celebrated great success at the Night of Scientists on September 27, 2021 in Nové Hradý

The night of scientists at the Institute of Complex Systems in Nové Hradý attracted a lot of public attention.

The program was built so that everyone could not only see the workplace, but even try some experiments in person. So visitors could assemble the microscope from lenses and a mobile phone and look at the interesting samples in the microscope. This approach completely changed the situation of those staff of the institute who “only” demonstrated the results, because everyone who came to them knew from their own experimental experience what was being shown or interpreted.

The main goal of the demonstration was to explain the advantages and technical problems of digital microscopy with a large field of view and high resolution and the technical breakthrough caused by quasi-spectral analysis. Visitors saw how a microscope with a large field of view differed from a microscope they had tested in another room. The results were then shown on the big screen, and everyone clearly understood that it would not be possible without the big screen, on the contrary, that even that would not be enough. So I think the visitors left our institute with a completely different idea of what modern digital microscopy is than they came to us.





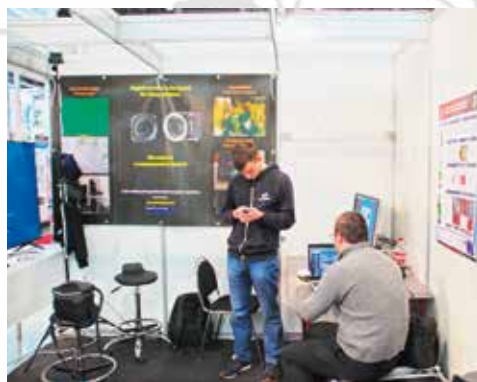
The stand of the ImageHeadstart ATCZ215 project at the International Engineering Fair in Brno attracted a lot of attention

From 8 to 12 November 2021, he exhibited the ImageHeadstart project at the International Engineering Fair in Brno. The stand was strategically located on the corner of the pavilion, which was closest to the main entrance to the exhibition center and adjacent to the large exhibitions of universities. Unlike these exhibits, where the information was rather “diluted”, our stand was conceived as a “hacker’s lair”, where not only information is passed in a dense form, but also created on the spot. And it fascinated.

We consulted and practically demonstrated almost without a break, in total we taught over 160 experts from several fields of engineering. Of course, we were most interested in material manufacturers, but also users of digital cameras in the field







of precision robotics, security and condition of operating fluids, security systems and more. The manufacturers of optical microscopes, Telight from Brno, and 20 other people interested in our microscope, spectrometer and personal tracking systems showed detailed interest.

We are currently preparing and gradually sending offers for specific candidates.

We also thank the Žumberk brewery, which supplied Černá Mamba beer to visitors.

Dalibor Štys

11th conference on industrial CT in Wels (Austria), 8.02. – 11.02.2022, online event

The iCT Conference 2022 was held online because of Covid-19 restrictions. Nevertheless, the relevance of Industrial X-ray computed tomography (XCT) is continuously increasing, mainly due to its great advantages in the non-destructive testing (NDT) of materials and components. In contrast to other NDT methods, XCT is able to provide three-dimensional representations of a component's internal structure. The biggest advantage of XCT is representation of hidden, internal features and defects (e.g. shrink-holes, cracks, inclusions, and pores) in three dimensions. Using XCT it is possible to determine physical variables like porosity and density using high-resolution, 3D image data.

In total, 393 participants from all over the world took part in the online iCT 2022. Industry as well as scientific presentations provided an insight into the latest developments as well as established methods. Claudia Wittner gave an ImageHeadstart talk during the short talk session on 10.02.2022 and the live stream recordings is available from the FH website (STP-24).

The conference gave the unique possibility to get in contact with various industry partners and several contacts were made, e.g. during personal session: Contact Industry Partners. For example, Dan Kytir from ITAM chaired the industry day session on Tuesday the 8.02.2022. The abstract booklet is available under Abstract Booklet.

Most importantly, a special session was held for the ImageHeadstart project which can be found in the program on page 17: https://www.fh-ooe.at/fileadmin/user_upload/fhooe/ueber-uns/kongresswesen/2022/iCT2022/programme/fhooe-iCT2022-Programme.pdf. During the Special Session, contact to other researchers as well as companies were made.



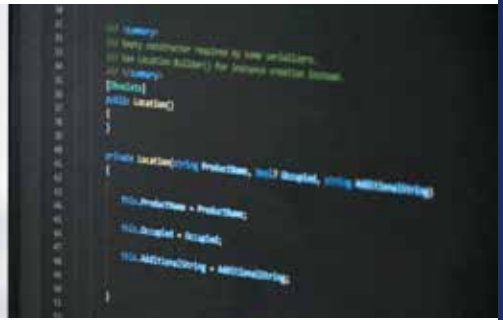
Presentation at the workshop of the Czech Optical Cluster on the topic of Microscopy

Workplace Brno

On 6-7. On the 10th, the ImageHeadstart project was presented at the Perspectives of Microscopy workshop organized by the Czech Optical Cluster at the Institute of Instrumentation of the ASCR in Brno. It was a very targeted presentation to a clearly defined group of interested people in the field of microscopy. The presentation took place in three ways: 1) Prof. Štys gave a lecture at the conference forum, 2) in the hall of the lecture hall, where refreshments were served, a video about the ImageHeadstart project was presented on a large board and 3) demonstration of the instruments developed in the project, large field microscope, X-ray tomograph and image processing software.







Synchronics engineering

The company, based in Heidenreichstein, Austria, develops software and hardware solutions mainly for use in automation. It mainly deals with autonomous transport systems and other industrial applications.

It has extensive experience in the development of the autonomous systems for logistics, software development for industrial applications, etc.

This experience and knowledge was very helpful during the consultation of the new spectrometer for the ATCZ215 ImageHeadstart project.



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Dalibor Štys

Laboratory of Experimental Complex Systems
Institute of Complex Systems
Faculty of Fisheries and Protection of Waters
University of South Bohemia
in České Budějovice
Zámek 136
373 33 Nové Hradý
Czech Republic
stys@jcu.cz
skype: dalistys
+420 777 729 58

Michal Vopálenský

Institute of Theoretical and Applied
Mechanics, Centre Telč
Czech Academy of Sciences
Batelovská 485
588 56 Telč
Czech Republic
vopalensky@itam.cas.cz
skype: michal_vopalensky
+420 567 225 343

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Sascha Senck

University of Applied Sciences Upper Austria
Research Group Computed Tomography
(Campus Wels)
Stelzhamerstraße 23
4600 Wels
Austria
sascha.senck@fh-wels.at
+43 (0)50804-44426

Michael B. Fischer

Department for Biomedical Research
Faculty of Health and Medicine
Danube University Krems
Dr. Karl-Dorrek Straße 30
3500 Krems an der Donau
Austria
Michael.fischer@donau-uni.ac.at
+43 2732 893 2685

Jiří Koleček

International Environmental
Educational,
Advisory and Information
Centre of Water Protection
Vodňany
University of South Bohemia
in České Budějovice
Na Valše 207
389 01 Vodňany
Czech Republic
jkolecek@frov.jcu.cz
skype: jirikolecek
+420 606 050 576

Jaroslav Jacak

University of Applied Sciences Upper Austria
Department of Medical Engineering
NASAN-Research Group
Garnisonstr. 21
4030 Linz
Austria
Jaroslav.jacak@fh-linz.at
skype: jarekjacak
+43 5 0804 52130

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EUROPEAN UNION
Austria-Czech Republic
European Regional Development Fund