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Computer vision integration into the NICOS

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Our work focuses on the development of an Automatic Laue Sample Aligner (ALSA) that allows to increase the sample size for neutron experiments, by fully automating the co-alignment process [1]. However, the sample manipulation, which utilizes a precise robotic arm (Mecademic Meca500 [2]), requires also advanced use of computer vision (CV). This poster presents our integration of general computer vision capabilities into the instrument control software NICOS [3].

The whole set of code includes integration of the Basler cameras hardware, image processing techniques (object detection), state-of-art cameras alignment procedures and ways to store and stream obtained images. We've achieved substantial gains in automation efficiency. Looking forward, we envision native CV support with NICOS, to cover a wider spectrum of laboratory tasks beyond crystal detection, from instrument calibration to dynamic decision-making.

We invite meeting attendees to explore our achievements and join the conversation about the practical applications and potential growth of CV in NICOS.

[1] <https://mambaproject.cz/alsa>

[2] "Six-axis robotic arm driver: Zoning out with Frappy and NICOS", poster, Štěpán Venclík, MLZ users 2023

[3] Brandl, Georg, et al., 10th International Workshop on Personal Computers and Particle Accelerator Controls. No. IMPULSE-2014-00016. FZJ, 2014.

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