

## Interface upgrades provide high level control over JEOL TEM operation

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### Abstract

Contemporary TEM experiments relying on the acquisition of large datasets, including single-particle analysis and electron tomography, involve many steps where the alignment of the column and the position of the beam are optimised towards achieving the best possible data resolution. While the number of experienced operators is on the increase, there is a clear need for the adoption of a scripting interface that would allow for the unification and standardisation of experimental approaches among different users and facilities.

Looking back in time, although external control has always been available on JEOL microscopes, its usage required expert knowledge in low-level interface programming. To enable easy automation on the contemporary JEOL platform, and to provide further compatibility with other commercial and free-to-use software packages (such as SerialEM), we have developed and introduced to the market PyJEM. It is a software library that makes it possible to control JEOL microscopes with Python – a modern royalty-free high-level programming language, which has been commonly used in academia, especially in the context of data processing. From short console scripts to powerful graphical applications – several software packages have been already developed, with scripts targeting remote control being of particular interest during the COVID pandemic.

This talk will introduce attendees to PyJEM and will highlight exemplary packages enabling mouse and touch control on TEM microscopes. Additionally, using aberration-free image shift as an example, we will demonstrate how Python can be used to calculate and apply the necessary beam corrections in real-time.