A Better Interface for Aligning a Microfocusing System

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Introduction

The Materials Research Collaborative Access Team (MR-CAT) beamline at the Advanced Photon Source [1] has, as one of its primary capabilities, elemental mapping and spectroscopy using a microfocused beam. The x-rays are focused to a spot size of approximately 5μ× 5μ using a Kirkpatrick-Baez mirror pair.

Aligning this microfocusing system during experiment setup requires the control of thirteen motors: four to manipulate each of the two mirrors, three to position the sample stage, and two to position the camera. Originally, a mixture of MEDM windows and motor command line control programs were used in this process. This approach, although functional, resulted in inconsistent user interfaces for different motors in the system. As a result, the alignment procedure was difficult to explain and arduous to perform. We recognized that the alignment process could be improved by providing a simple, uniform user interface for manipulating the mirror, sample stage, and camera motors. A graphical user interface was developed to fulfill this roll and is now used to align the microfocusing system at MR-CAT.

Methods and Materials

The microfocusing alignment program was developed using Python, a high level object-oriented programming language [2]. Tkinter, Python's cross-platform interface to the Tk graphical user interface toolkit, was used to implement the graphical portion of this program. Programmatic control of the various motors was provided by Python language bindings to the MX Data Acquisition and Control system [3]. The program was designed to integrate with the local MX installation while retaining the ability to use custom MX device databases and motor configurations as necessary.

Results

A screen shot of part of the new alignment program is shown in Fig. 1. When used to align the microfocusing system at MR-CAT, this program saved an average of two hours of setup time. It also decreased the possibility of errors that stem from switching between several MEDM and motor windows during the alignment process.

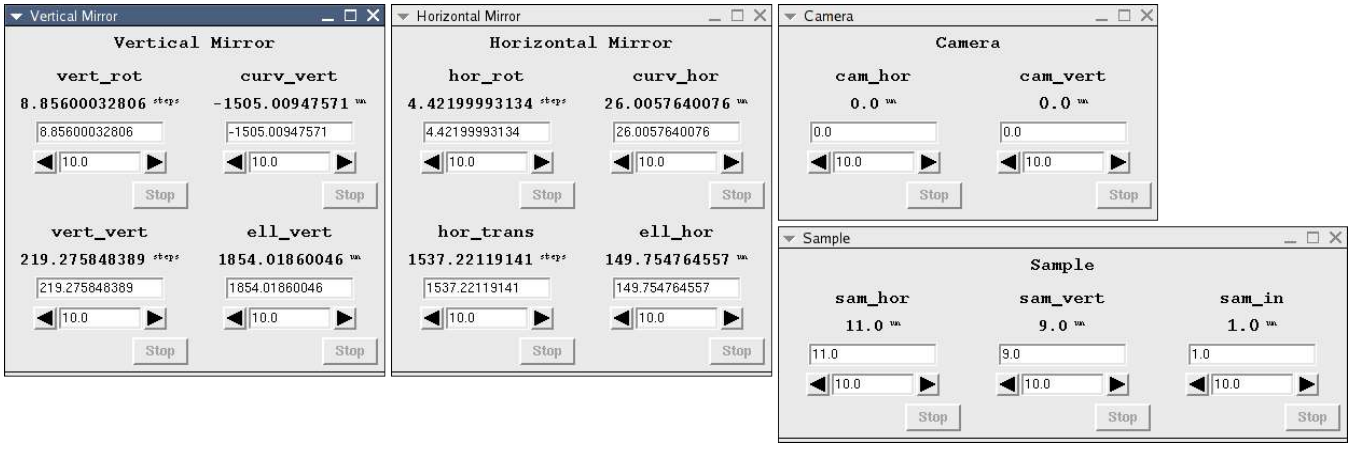

Fig. 1 The four control windows of the new microfocusing system alignment software.

Discussion

Developing custom software for aligning the microfocusing system at MR-CAT has resulted in a simpler, more efficient setup process that has saved users hours of beam time. Future work is planned to develop more intuitive interfaces for controlling different components of the system.

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References

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[2] Python Programming Language homepage, http://www.python.org

[3] W.M. Lavender, *Synchrotron Radiation Instrumentation: Eleventh US National Conference*, **CP521**, 322 (AIP, New York, NY, 2000); MX Data Acquisition and Control System homepage, http://mx.iit.edu