Python and PyDM Interface to Communicate with Aerotech Ensemble Motor Controllers

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Introduction

Electrical Engineering Department (EED) uses different controllers to remotely monitor and control moving devices along the accelerator. One of the motion controllers used extensively in Linear Accelerator Coherent Light Source-II (LCLS-II) is Aerotech Ensemble Drive. These Aerotech drives control servo and stepper motors through an EPICS IOC (Input output Controller). The objective of this project was to review and update a Python interface to communicate with Aerotech Ensemble controller in Linux without an EPICS IOC. Data collected from the motors connected to this controller is saved into several files. These files along with controller parameters are exposed to the Linux server using this Python interface.

Python Communication

- Ensemble Communication
  - write_read: axis status, axis fault, move command, etc.
  - Macros: host, port, rate, axis

Aerotech PyDM Plugin

- PyDMConnection
- PyDMPlugin
- WriteOnly Parameter
- Client Thread
- PollThread
  - PollThreadTaskStatus
  - PollThreadAxisStatus

Inheritance diagram of PyDM Plugin

User Interface (cont.)

Future Steps

This project only tests one object: the servo motor. The three software programs mentioned in the introduction section are used to control the object. To ensure that the motor works, correct configuration settings need to be in place in the Configuration Manager by connecting to the microcontroller, having the right values for the parameters, and ensuring that the computer and the microcontroller are connected. Different motors can be tested in the future like the stepper motor to view the parameters that are not applicable to the current motor.

Some Ensemble controllers have the ability to control multiple motor axes. The current interface only support one axis. In the future, this can be expanded to multiple axes.

Acknowledgments

Acknowledgements also go to my mentor Namrata Balakrishnan, and my coworkers who helped me with this project: Yekta Yazar, Ryan McLellan, Matt Gibbs, Zach Domke, and Gibreel El-Halabi.

Special thanks to Kristi Luchini, An Le (my brother), and SLAC staff for this internship and showing me around campus.

Date: 8/11/2022