Controls and Analysis Software for OTRs

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Controls s/w Needed

- Low-level drivers for:

  - CCD frame-grabber

  - x-y target mover

  - lens focus mover

  - OTR insertion actuator

- EPICS drivers and DB

  - Choose h/w with EPICS module support

- High-level interface

  - EDM, FS etc...

h/w Suggestions

- All controls on standard dedicated rackmount PC running linux (SL5) on atf-local subnet, connection to h/w via LAN.

- 2 * Newport XPS-C8 motion controller

  - LAN connection + good EPICS support through standard motor module.

  - 16 channels enough for all motion stages and focus + 4 spare.

  - Also gives 8 channels of ADC/DAC and 60 TTL I/O - use for OTR insertion control?

- Prosillica GigE camera from GC range

  - LAN connection + good EPICS support through areaDetectors module.

Analysis s/w

- Can be done in any scripting/programming environment supported by EPICS CA (lots- e.g. C, C++, Perl, Python, Matlab, TCL ...)

  - Output processed data to EPICS PVs when done

  - Scripts/code should also be controllable via PVs

- 2-D gaussian fitter, taking CCD image and generating beam matrix data.

  - Also online Twiss/Emitt calculations (can use Model data from FS)

  - Upgrade FS EXT emittance minimisation application to use

- Beam finder and tracker

  - Track interpolated beam positions in OTR target locations using adjacent BPMs (can use input from FS for R matrices and BPM readings) for faster initial OTR insertion.

  - Also have intermittent target insertions to check tracking.

  - Similar s/w planned for multiwire system - can probably piggyback on this.

h/w Protection

- Target & CCD radiation sensitive- need to minimise time target exposed to beam

- Do this as a software control

  - Have "target in" alarm visible in control room

  - Lockout of "move in" control if Q high (multibunch)

Controls Work Tasks

- Decision on motor controller and camera by end of June.

- Purchase h/w and PC (if needed)

- Write/install EPICS drivers and EPICS software.

  - ~1-2 days if all EPICS drivers exist (and no unexpected problems), ~1-2 months if no drivers already written.

- Design + write EPICS database (~ 2 weeks)

  - Agree beforehand on list of PVs and their functionality

- Design + write front-end CA interface (EDM or whatever...)

  - About 1-2 weeks work assuming familiarity with interface system.

- Above times assume knowledge of EPICS: if no prior EPICS IOC experience, need ~1 month to listen to lectures/read literature etc.

Time-scale

- Controls work will take 1-4 months depending on h/w choices and experience.

- If start July and 100% * 1 person effort, can expect to finish in October.

- Analysis s/w on same time-scale depends upon available people (CCD data -> beam ellipse and Twiss; beam tracking)