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Abstract: A set of powerful tools have been developed with LabView 7.0 for the ORNL Second Generation Neutron Residual Stress mapping Facility (NRSF2) at the High Flux Isotope Reactor. The software provides automated instrument control with fast data collection option, load frame control, system calibration, and post collection and real-time data processing. Individual programs communicate each other via TCP/IP protocol over a local intranet.



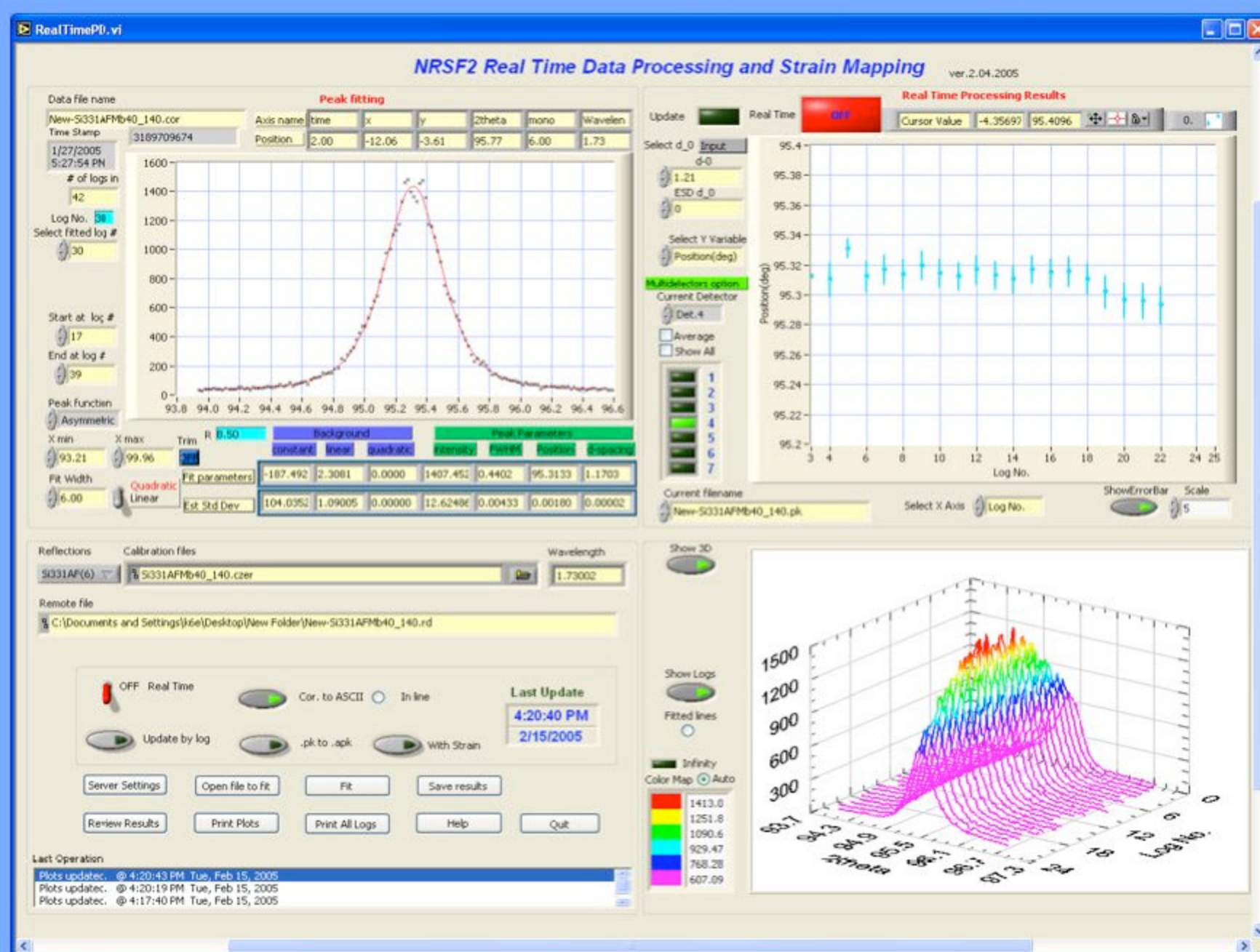
Motor driver PC



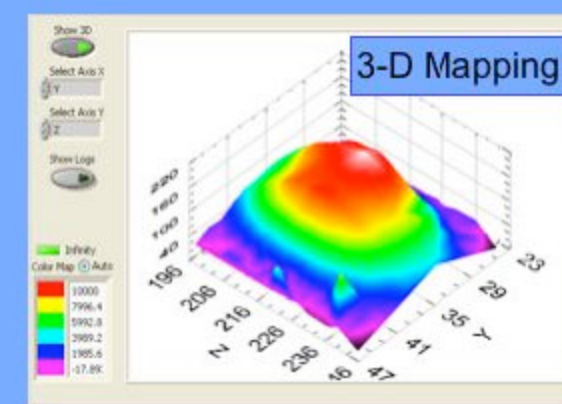
GPIO interface communicates with motor controllers for NRSF2 XYZ- Ω stages, 2θ goniometer, X- Φ goniometer, and axes of the monochromator.



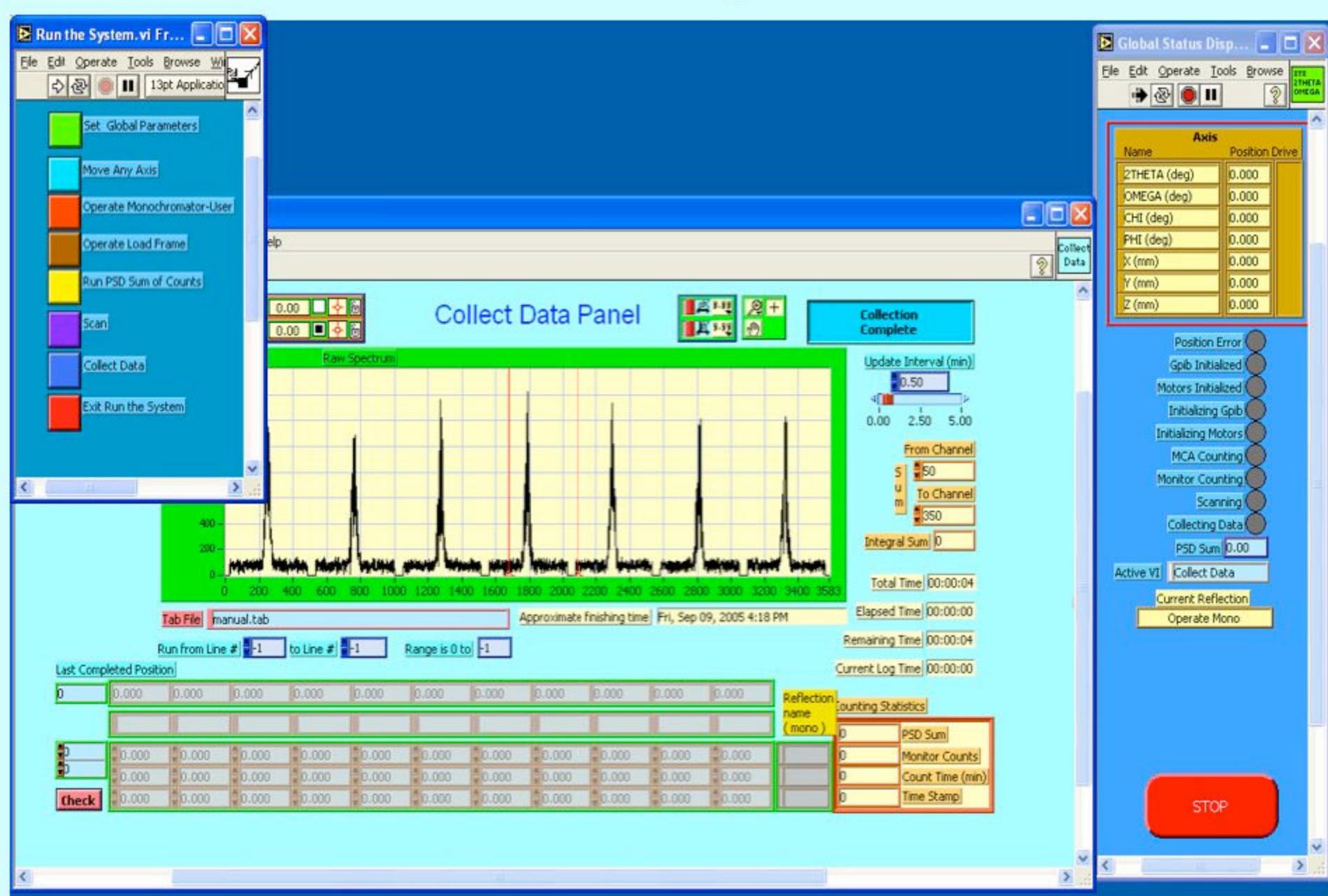
Real-time data processing



- Real-time communication with Run-the-System
- Corrects raw data and fits peak profile
- Shows fitted results in 2D and/or 3D views
- Review processed results
- Reports results
- PC and Macintosh compatible
- Run-time version enables post processing



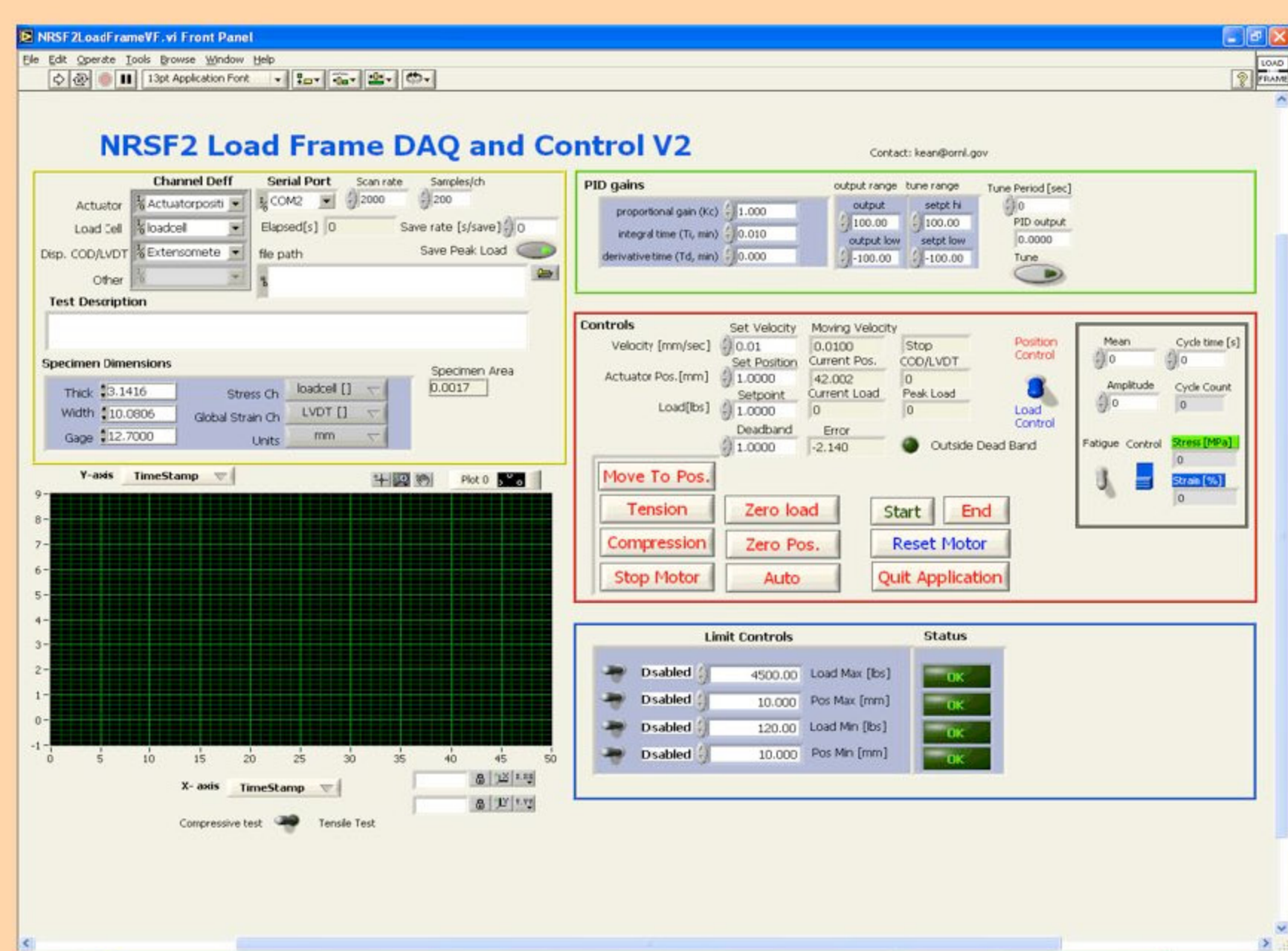
Run-the-System



Automatic instrument control and DAQ written in LabView provides the following features:

- Move any axis – XYZ- Ω , 2θ , X, Φ
- PSD Counting – Peak profile preview and counting time estimation
- Edge Scan – Accurate surface finding
- Collect Data – Neutron profiles measurement from 7 detectors
- Operate Load Frame – In-situ strain measurement
- Operate Monochromator – Multi-wavelength selection

Load frame control with NI DAQ



- 5k lbs electric actuator
- Load/displacement control
- Uniaxial tension/compaction and compact tension specimens
- Cyclic loading
- LVDT/COD/Extensometer macro strain measurement
- Accessory signal DAQ such as temperature, voltage and current
- Local or remote controllable by Run-the-System