

iSHELL INSTRUMENT CONTROLLER OVERVIEW

- Tony Denault – Software Programmer
- Eric Warmiber – Electronic Engineer

What is the iSHELL Instrument Controller?

iSHELL has 3 control systems.

- Spectrograph Camera System – Computer, Controller, and electronics used to readout the H2RG Array.
- Guider Camera System – Computer, Controller, and electronic used to readout the Aladdin Array.
- Instrument Controller System – Computer, controllers, and electronics to do:
 - Motor control
 - Temperature control and monitoring
 - A/C power control.
 - Other hardware control.

What is controlled by the iSHELL Instrument Controller?

On page 4 of the Instrument Controller Overview, a table lists the items to be controller. Below is summary of these items.

- 12 Mechanisms using stepper motors. 3 are warm located in the calbox, and 9 are cold located inside the dewar.
- Sensing for ~23 position sensors or switches. A combination of analog and digital channels.
- 5 Temperature Control loop: H2RG, Aladdin, Grating #1, Grating #2, and the Gas Cell.
- 10 Channels of temperature monitoring.
- Power control for 3 calibration lamps.

The iSHELL Instrument Controller

Our plan for the iSHELL Instrument Controller is to copy of the SpeX Instrument Controller.

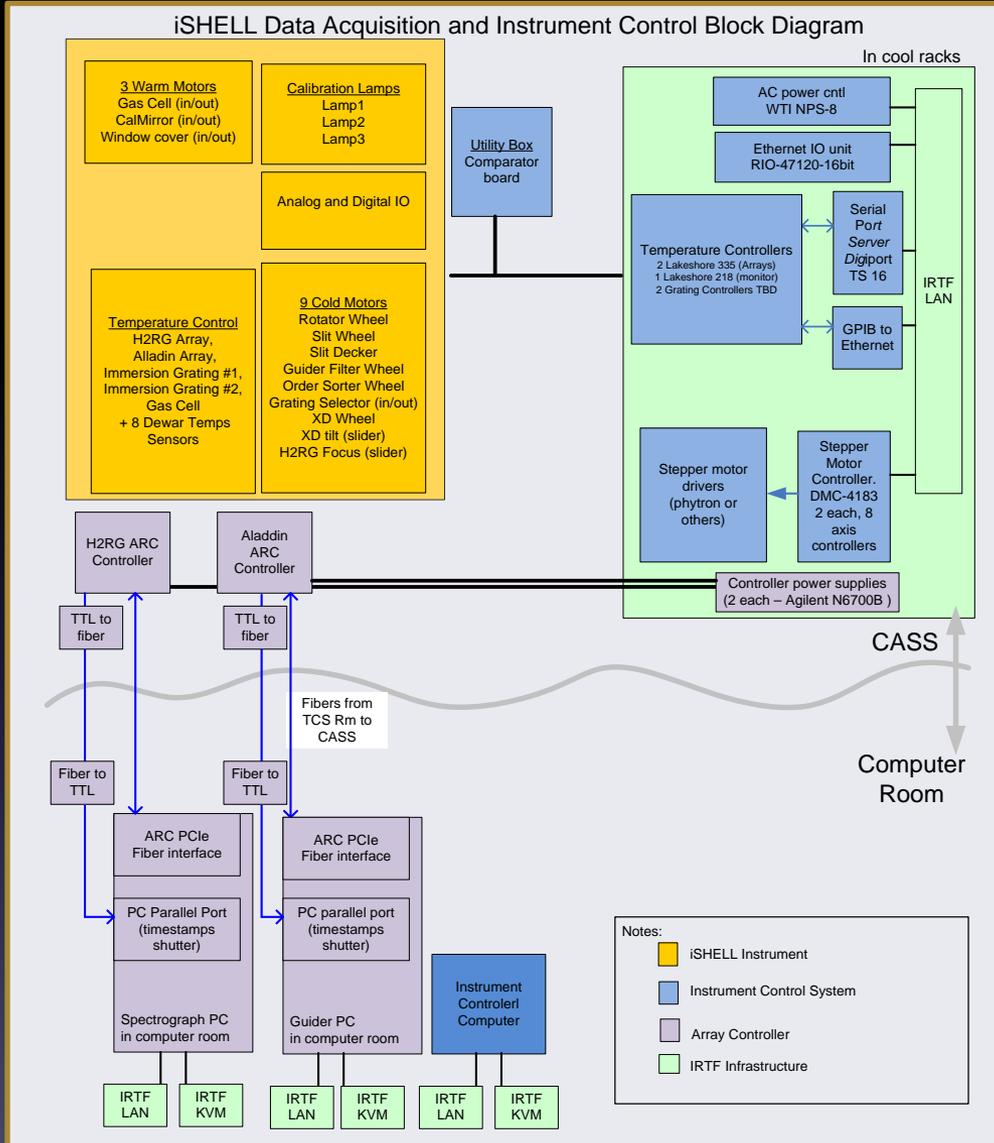
SpeX is currently being upgraded. Its instrument controller is being replaced. SpeX has:

- 6 stepper motor (warm).
- 2 servo motors (warm)
- 4 A/C power outlets (Lamps)
- 2 temperature controllers (H2RG, Aladdin).
- 10 channels of temperature monitoring.
- 8 channels of analog input.

The SpeX Instrument controller is being built and written so that it can be replicated for iSHELL.

This provides iSHELL with a proven design that can be implemented very quickly.

The iSHELL Control System Block Diagram



iSHELL Control System diagram on page 6.

Color coding:

- Orange = iSHELL
- Purple = H2RG and Aladdin Camera Systems
- Blue = Instrument Controller

Instrument Controller PC in the computer room.

Hardware controllers are located in the coolrack electronic box at the telescope.

All cool rack controllers are access using Ethernet.

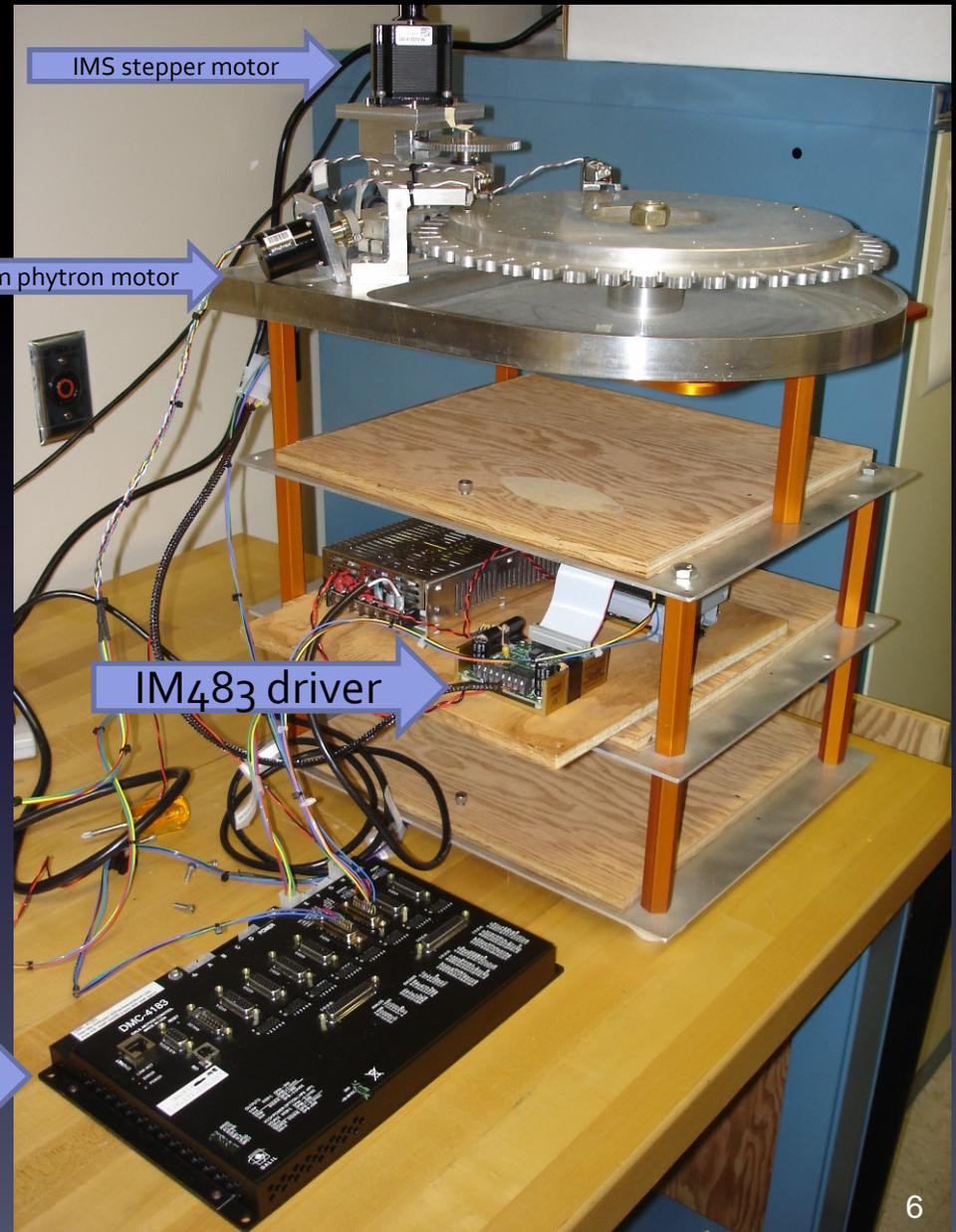
All hardware has be used at the IRTF or is being used in the SpeX upgrade.

iSHELL Instrument Controller Hardware 1

Galil DMC-4183 Motor Controller

- 8 axis motor controller
- 8 analog inputs
- 16 digital input
- 16 digital outputs
- Ethernet interface.

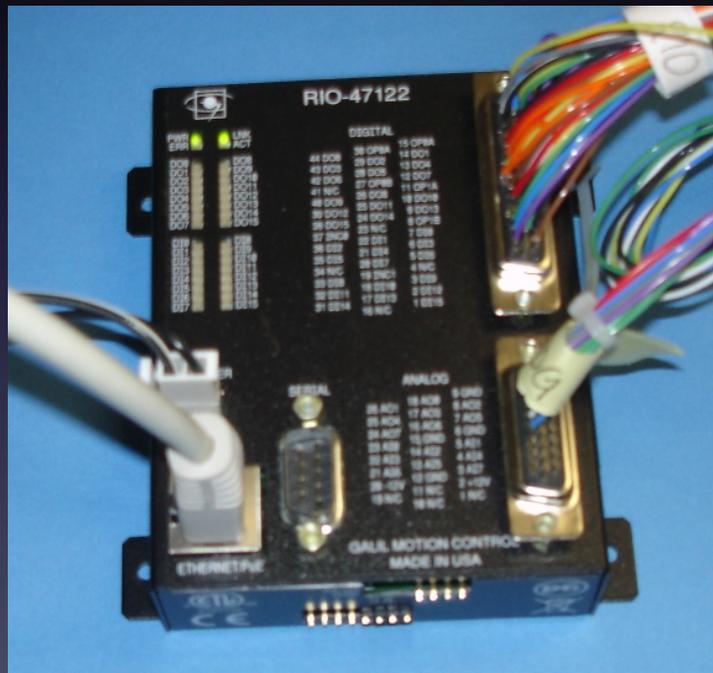
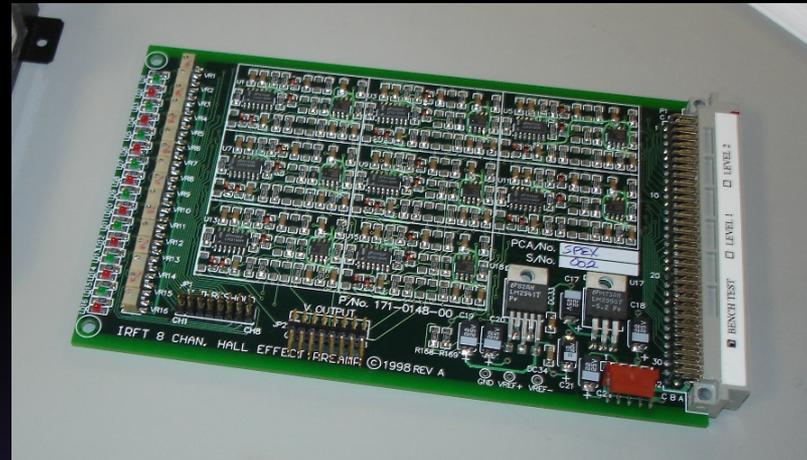
IM483-24PI micro stepping motor driver.



iSHELL Instrument Controller Hardware 2

Hall Effect Sensor Conditioning Hardware

- The current SpeX comparator board is shown. In-house design.
- We plan to use an updated version of the this board for the SpeX upgrade, and iSHELL.



For Additional Analog or Digital IO

Galil RIO-47120-16bits

- 8 analog inputs
- 8 analog outputs
- 16 digital inputs
- 16 digital outputs
- Ethernet port
- Used by the IRTF TCS.

iSHELL Instrument Controller Hardware 3

Lake Shore

335 Temperature Controller

- Newer version of the 330 (SpeX), 332 (NSFCAM) used by the IRTF.
- Ethernet interface provide by a Prologix GPIB-Ethernet device.



Lake Shore 218 Temperature monitor

- Newer version of the 208 used by SpeX.
- Interface is RS-232

Digi PortServer

- RS-232 to Ethernet
- IRTF uses various model of the PortServer..

iSHELL Instrument Controller Hardware 4

Instrument Controller Computers

- Standard PC
- Linux OS
- Being used to develop the SpeX Instrument Controller Software.



WTI NPS-8

- 8 outlets of A/C power control over Ethernet.
- To be used for Calibration Lamps.