SNAP
SuperNova/Acceleration Probe
NIR Test Software

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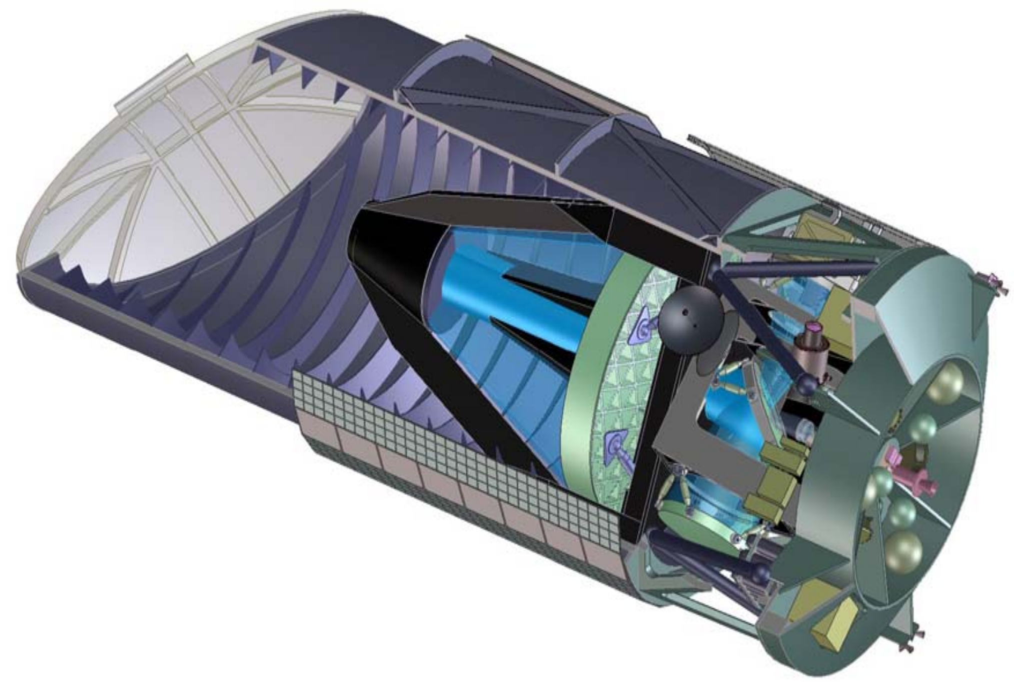
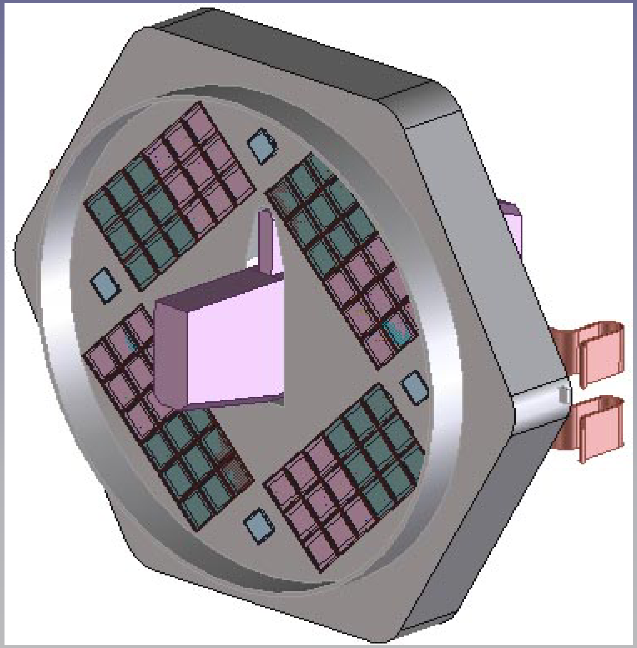
What is SNAP?

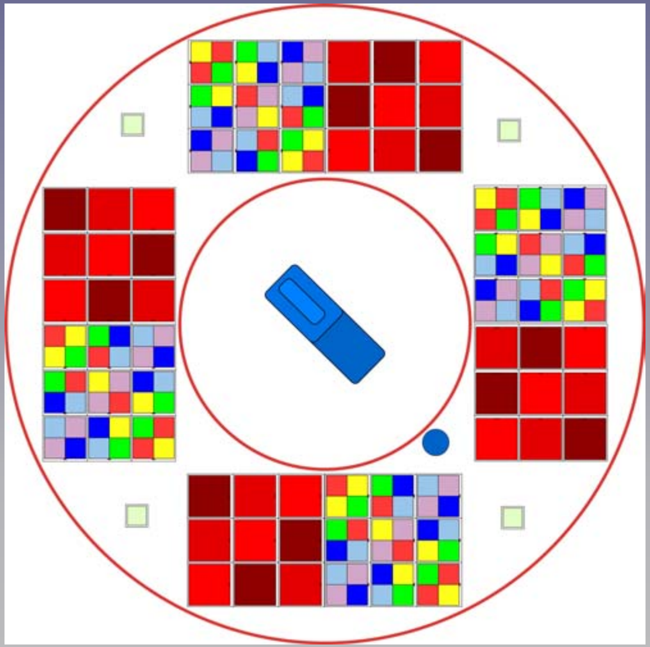
- Expansion of the universe is accelerating – we don’t know what kind of energy is causing this acceleration
- Space-based telescope to study the expansion of the universe through distance-redshift relation of supernovae
- Expected to find and analyze over 2000 supernovae per year



NIR Sensors

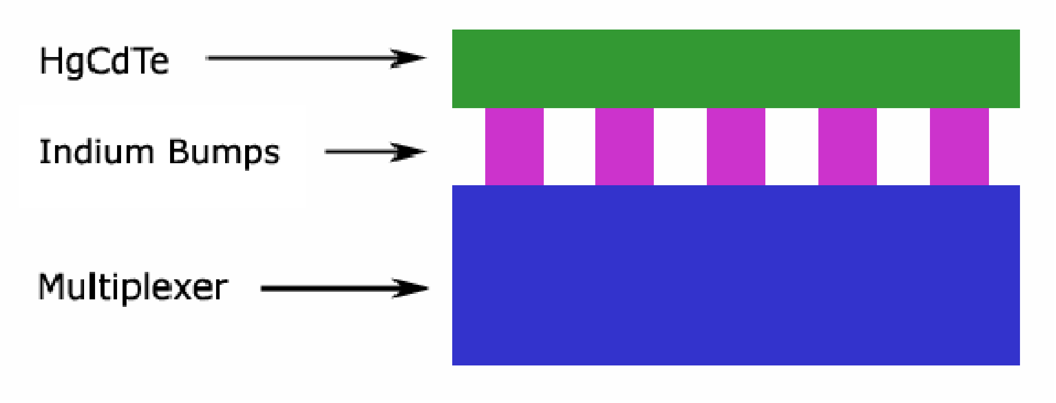
- Wavelength coverage: 0.35 - 1.7 µm.
- Sensors
  - 2k x 2k HgCdTe NIR sensors covering 0.9-1.7 µm.
  - 3.5k x 3.5k CCDs covering 0.35-1.0 µm.
- Michigan group is responsible for testing NIR sensors

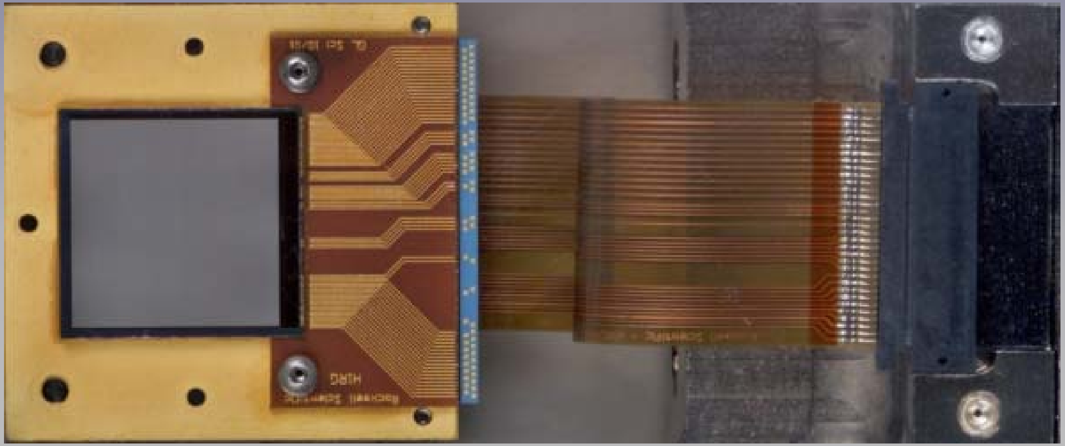




NIR Sensors

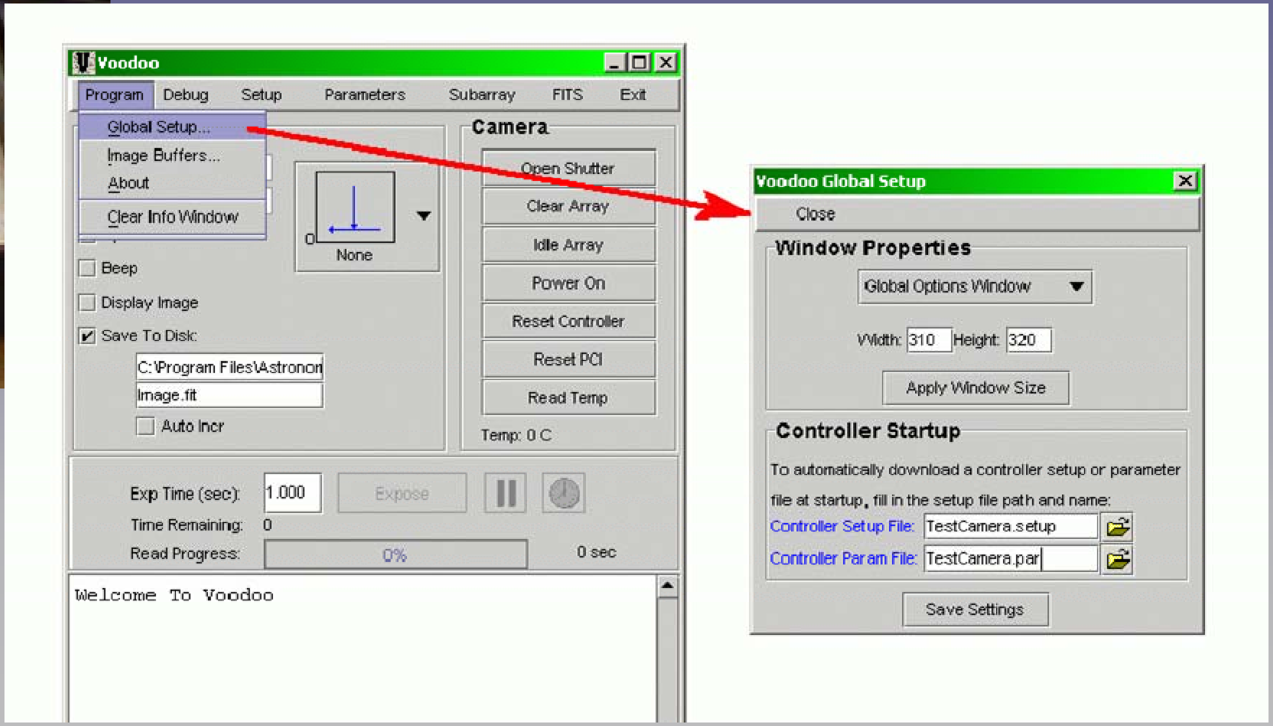
- The HgCdTe NIR sensor are attached to a mux (multiplexer)
- 2048 x 2048 pixel mux
- Mux sends the readout to the PC





NIR Test Software

- **Assembler code to control the mux**
  - Set exposure type
  - Readout modes
- **"Voodoo" software provides graphical user interface (Java)**
  - Start/stop exposures
  - Create FITS files for images
- **IDL etc. for final analysis**



□ Beep
□ Display Image
☑ Save To Disk:
C:\Program Files\Astronon
Image.fit
□ Auto Incr
Temp: 0 C
Exp Time (sec): 1.000
Time Remaining: 0
Read Progress: 0%
0 sec

```
Welcome To Voodoo
```

Global Options Window
Width: 310 Height: 320

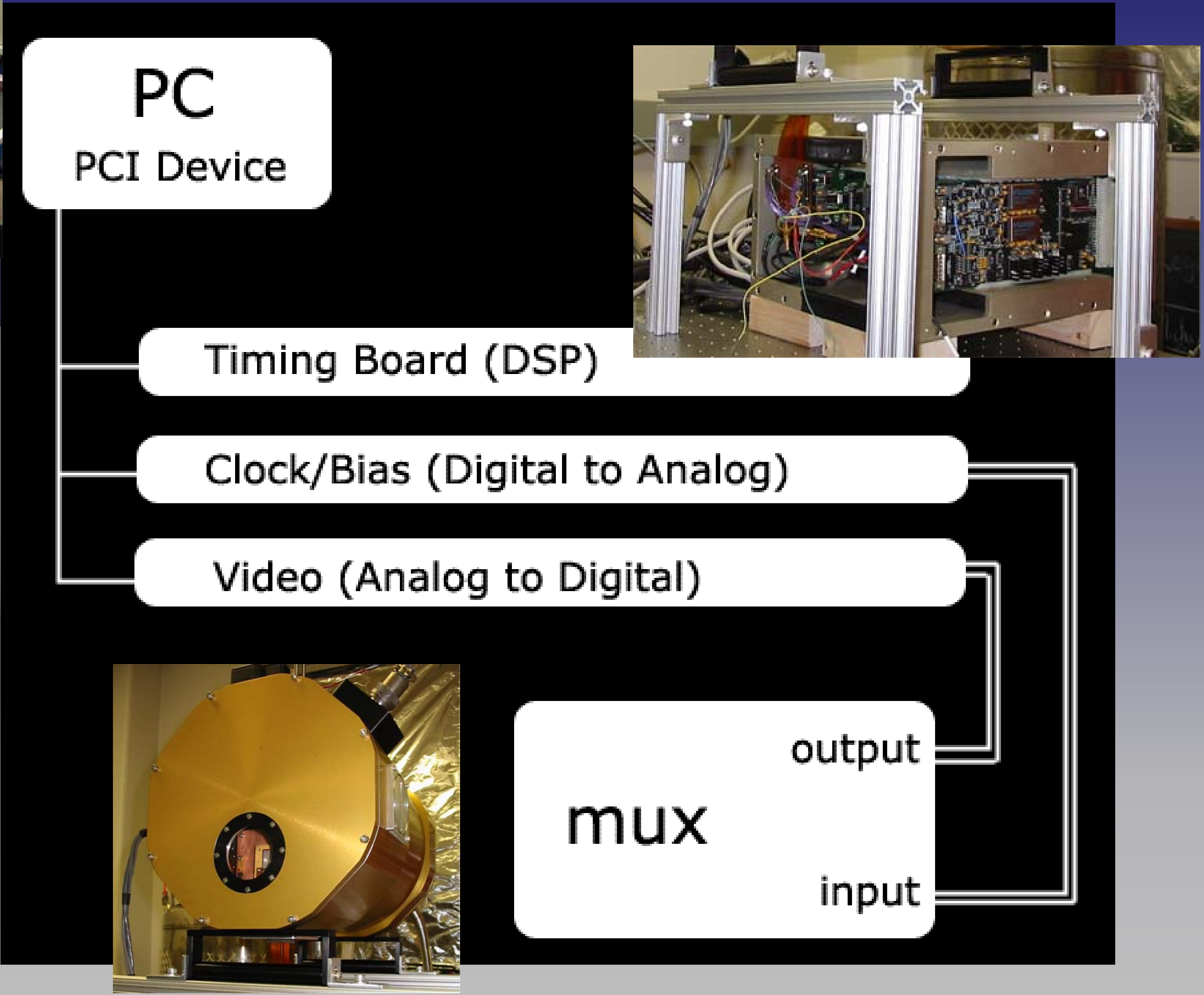
To automatically download a controller setup or parameter file at startup, fill in the setup file path and name:

Controller Setup File: TestCamera.setup
Controller Param File: TestCamera.par

NIR Test Software

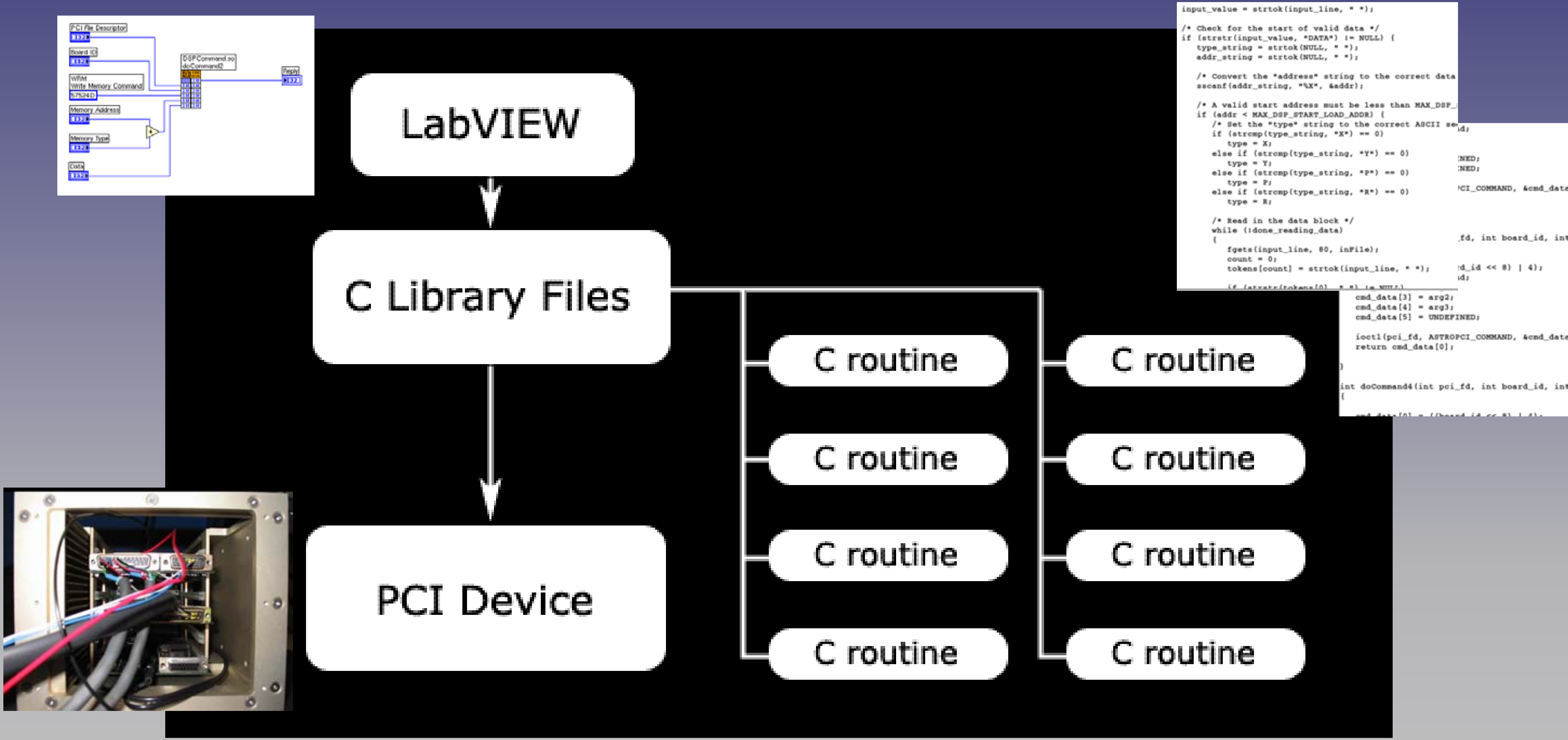
- Weaknesses of Voodoo
  - Not well documented
  - Hard to modify
  - Makes complex tests difficult
- Necessary to develop our own package of controller software using LabVIEW
  - Widely used commercial tool for DAQ software
  - Integrate new devices into a common framework:
    - **Shutters**
    - **x-y-z stages for intrapixel controller (spot-o-matic)**
    - **Light sources**
    - **Temperature sensors**
    - **Pressure sensors**

NIR Test Software Development



NIR Test Software Development

- No support for low level device driver system calls in LabVIEW
- C library files must be developed for communication with the PCI device through LabVIEW

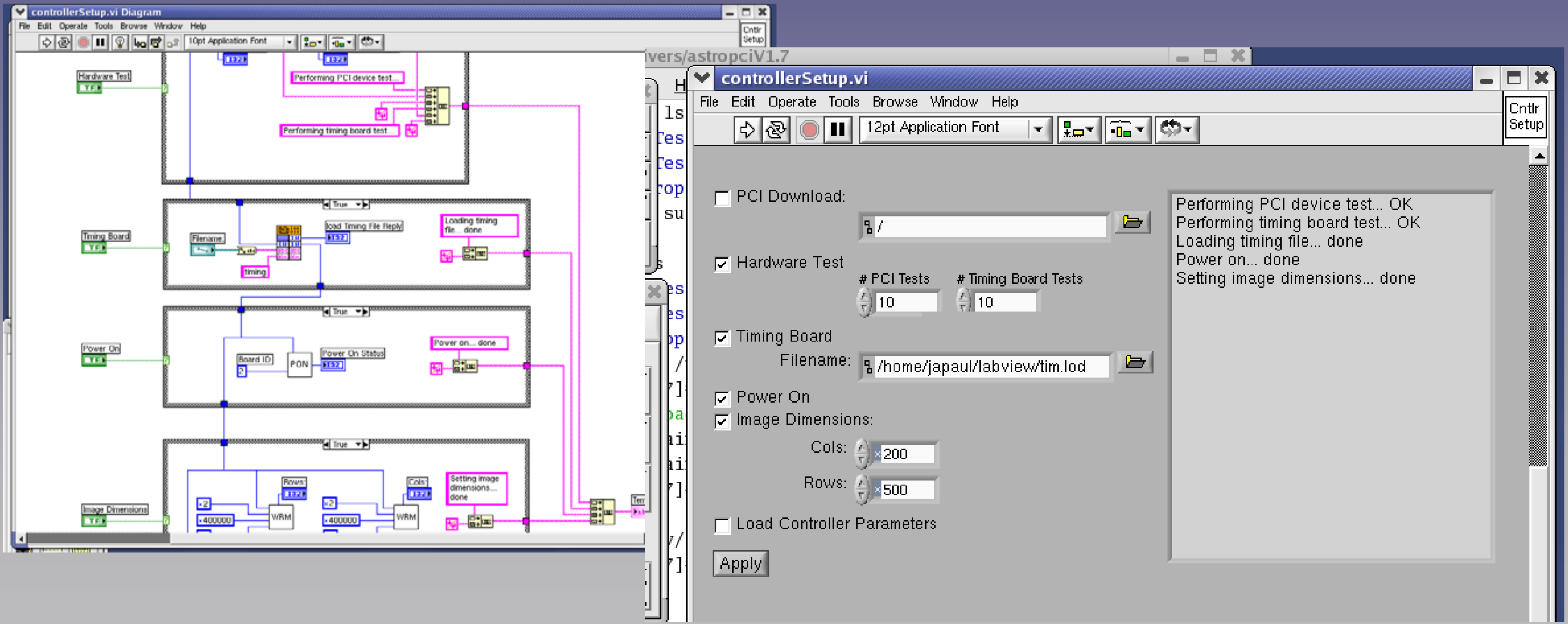


```
input_value = strtok(input_line, " ");

/* Check for the start of valid data */
if (strstr(input_value, "DATA") != NULL) {
   type_string = strtok(NULL, " ");
   addr_string = strtok(NULL, " ");

   /* Convert the "address" string to the correct data
   sscanf(addr_string, "%X", &addr);

   /* A valid start address must be less than MAX_DSP_
   if (addr < MAX_DSP_START_LOAD_ADDR) {
      /* Set the "type" string to the correct ASCII se
      if (strcmp(type_string, "X") == 0)
         type = X;
      else if (strcmp(type_string, "Y") == 0)
         type = Y;
      else if (strcmp(type_string, "P") == 0)
         type = P;
      else if (strcmp(type_string, "R") == 0)
         type = R;

      /* Read in the data block */
      while (!done_reading_data)
      {
         fgets(input_line, 80, inFile);
         count = 0;
         tokens[count] = strtok(input_line, " ");
```

```
d;

NED;
NED;

CI_COMMAND, &cmd_date

_fd, int board_id, int

d_id << 8) | 4);
d;
   cmd_data[3] = arg2;
   cmd_data[4] = arg3;
   cmd_data[5] = UNDEFINED;

   ioctl(pci_fd, ASTROPCI_COMMAND, &cmd_date
   return cmd_data[0];

}

int doCommand4(int pci_fd, int board_id, int
{
```

Current Progress

- C library development to establish a connection with the PCI
- Establish a connection with the PCI device through LabVIEW
- Load assembler code onto the timing board
- Create FITS files for images from the mux



☐ PCI Download: /

☑ Hardware Test

PCI Tests: 10

Timing Board Tests: 10

☑ Timing Board

Filename: /home/japaul/labview/tim.lod

☑ Power On

☑ Image Dimensions:

Cols: 200

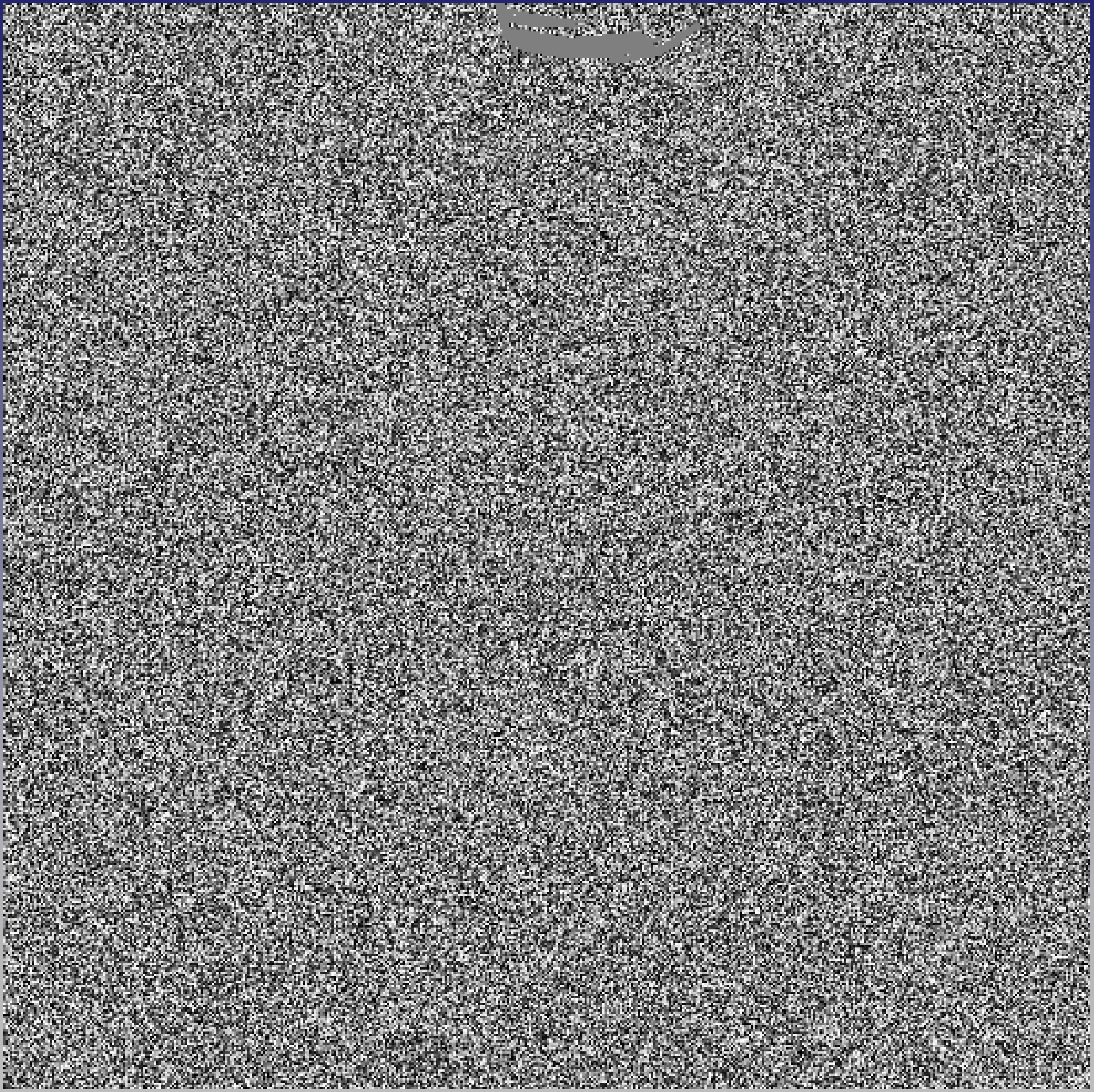
Rows: 500

☐ Load Controller Parameters

```
Performing PCI device test... OK
Performing timing board test... OK
Loading timing file... done
Power on... done
Setting image dimensions... done
```

Current Progress

SNAP SuperNova Acceleration Probe
at the University of Michigan



Future Plans

- Develop various exposure sequence types
- Develop better software structure for maintenance