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HERMES Manual!

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# Overview

# Data Acquisition

## System Overview

The acquisition scripts interface with the TPX3Cam and SPIDR readout boards using the tpx3serval Python library. These scripts are capable of configuring the camera, setting up run directories, logging configuration files, and performing one or more acquisition runs.

## Directory Structure

HERMES adopts a structured directory layout. The working directory contains one folder for each run and several subfolders for specific data types.

Example Directory Layout:Text

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The acquireTpx3.py script will automatically generate these folders if they do not already exist.

## Configuration File

The acquire\_config.ini file defines all configurable parameters for acquisition.

**Sections and Parameters:**

 **[WorkingDir]**

* path\_to\_working\_dir: Full path to working directory (required)
* path\_to\_init\_files: Path for initialization files (default: initFiles/)
* path\_to\_status\_files: Path for status files
* path\_to\_log\_files: Path for log files
* path\_to\_image\_files: Path for image files
* path\_to\_preview\_files: Path for preview files
* path\_to\_rawSignal\_files: Path for .rawSignals files
* path\_to\_raw\_files: Path for raw .tpx3 files

 **[ServerConfig]**

* serverurl: URL for TPX3Cam server (default: http://localhost:8080)
* path\_to\_server: Path to the Serval directory
* path\_to\_server\_config\_files: Path to camera settings directory
* bpc\_file\_name: Pixel configuration filename
* dac\_file\_name: DAC configuration filename
* destinations\_file\_name: Server destinations file
* detector\_config\_file\_name: Detector configuration file

 **[RunSettings]**

* run\_name: Name for the run (used as folder name and in filenames)
* run\_number: Starting run number (default: 0000)
* trigger\_period\_in\_seconds: Camera trigger period
* exposure\_time\_in\_seconds: Exposure time (must be ≤ trigger period)
* trigger\_delay\_in\_seconds: Delay before triggers
* number\_of\_triggers: Number of triggers per run
* number\_of\_runs: Total number of runs to perform
* global\_timestamp\_interval\_in\_seconds: Timestamp interval

## 2.4 Command Line Interface (CLI)

### 2.4.1 Default Behavior

The CLI provides a flexible way to run acquisitions. Defaults are built into the script; a configuration file and/or CLI flags can override these defaults.

Usage:

In the same directory as the acquireTpx3.py script, run:

Text

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* No configuration file is required by default.
* Built-in defaults can be used directly.
* Configuration options can be provided via:
  1. Config file (-c or --config)
  2. CLI flags (highest precedence)

**Default Behavior (no config):**

* Trigger period: 10 s
* Exposure time: 9 s
* Number of runs: 1

### 2.4.2 CLI Flags

**General Options**

* -h, --help: Information on available commands
* -c, --config: Path to config file
* -W, --working-dir: Working directory path
* -r, --run-name: Run name (folder name and filename prefix)
* -N, --run-number: Starting run number (integer, zero-padded as 0000)
* -n, --num-runs: Total number of runs
* -t, --trigger-period: Trigger period (s)
* -e, --exposure: Exposure time (s)
* -T, --num-triggers: Number of triggers per run
* -v, --verbose: Verbosity (0=quiet, 1=info, 2=debug)
* --dry-run: Print effective configuration and exit

### 2.4.3 Verbosity Levels

 **0 (quiet):** Only errors printed

 **1 (info):** Standard information messages (default)

 **2 (debug):** Full configuration printouts and detailed logs

### 2.4.4 Dry Run Mode

Use --dry-run to preview the final merged configuration (defaults + config + CLI flags) without running any acquisition.

## Examples

A screenshot of a computer

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## Parameter Precedence

1.  **CLI flags** (highest priority)
2.  **Configuration file** (-c)
3.  **Built-in defaults** (lowest priority)

## 2.7 Acquisition Process Flow

1. **Configuration:** Script merges defaults, config file, and CLI flags.
2. **Directory Verification:** Working directory and run folder are created or cleaned.
3. **Camera Check:** TPX3Cam connection is verified.
4. **Run Execution:**
   * Run number is incremented and formatted.
   * Configuration files and detector status are logged.
   * Exposure is started using the configured parameters.
   * Data is written into the appropriate subdirectories.

For details on TPX3Cam server and dashboard behavior, refer to the **Serval Camera Manual**.

# Unpacking Data

# Analyzing Data