

Thermal Camera Snapshot Controller

User Guide and Technical Documentation

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1 Introduction

1.1 Purpose

This document serves as both user manual and technical documentation for the PixConnect Snapshot Controller application, which automates thermal image capture during laser printing processes for the AI4Green project.

1.2 Scope

The application integrates with:

- PIX Connect software (via SDK)
- OPC UA server from TRUMPF
- Automated file management system

1.3 Key Features

- Dual-snapshot capture with laser exposure delay
- Automatic folder management
- Connection monitoring and recovery
- Manual override controls

1.4 Launching the Application

The shortcut for the app is located on desktop @ pixconnect_controller.exe. The application starts in Auto-snapshot mode enabled. Manual snapshot and record operations are still valid while process is enabled. The naming convention is {slice_number}_Record_{timestamp}.{ext} in case of manual trigger. Besides this, the operator has to ensure that PixConnect is started via the controller app only, otherwise the interface will not work. If the operation is not working, please restart the app.

1.5 Main Dashboard

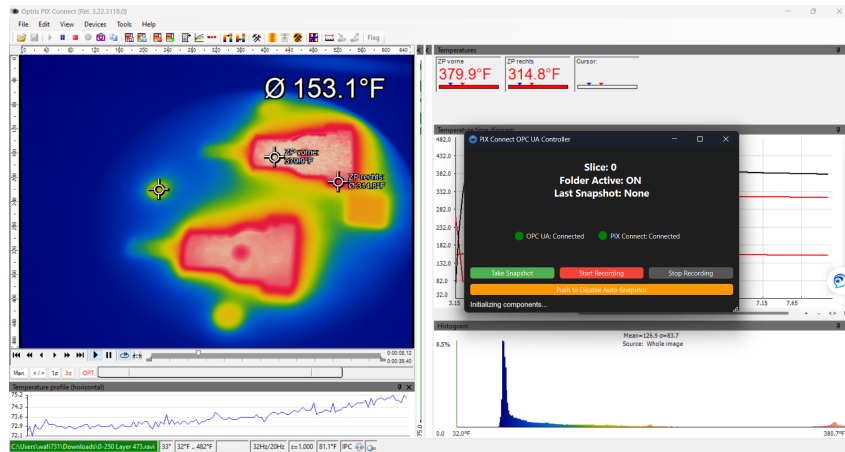


Figure 1: Main UI of the Snapshot Wrapper Application

2 System Overview

2.1 Architecture

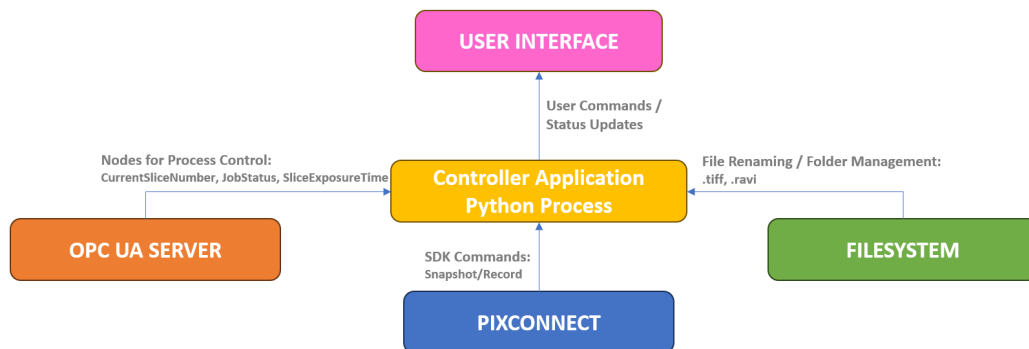


Figure 2: System Architecture Diagram

3 Installation and Setup

3.1 PIX Connect Configuration

The configuration for PixConnect has been completed but if there is an issue in running the app, please configure the following before using the application:

1. Open PIX Connect settings
2. Enable SDK connectivity:

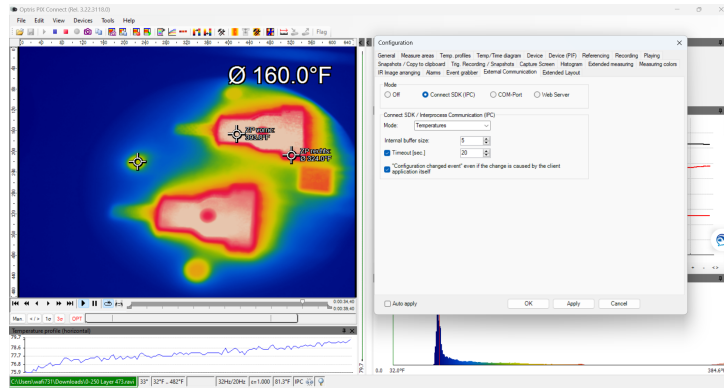


Figure 3: PIX Connect SDK Settings

3. Configure measurement areas as needed:

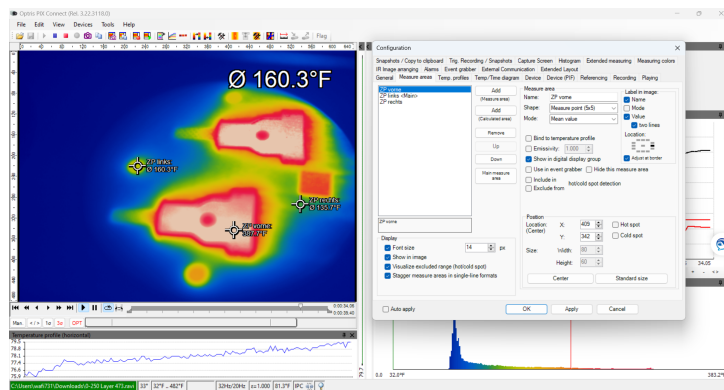


Figure 4: Measurement Areas Configuration

3.2 Installation Steps

If the program file is deleted, user may download the executable file from github.

```
git clone https://github.com/FWaheed-th/AI4Green_thermalcamera_controller.git
```

4 Operational Details

4.1 Dual-Snapshot Mechanism

The system captures two images per slice process:

- **"_recoated"** - Immediately after layer is started, before laser operation (from OPC UA node ns=10;s=225)
- **"_exposed"** - After laser exposure (from OPC UA node ns=10;s=220)

4.2 File Naming Convention

The system generates paired files for each layer:

| Trigger Phase | Example Filename | Content |
|---------------|--------------------------|----------------------------------|
| Recoated | 042_Record_recoated.tiff | Pre-exposure thermal data |
| Exposed | 042_Record_exposed.tiff | Post-exposure with laser effects |

5 Troubleshooting

5.1 Common Issues

- **SDK Connection Failed:** Verify PIX Connect SDK is enabled
- **Missing Snapshots:** Check node values in OPC UA server
- **File Permission Errors:** Run as administrator if accessing protected folders

5.2 Log Files

Application logs are stored in

- `pixconnect_controller.log` - Main application log which is placed in the folder `C:/Users/SelfAdmin/Documents/pixconnect-wrapper/`

6 Appendices

6.1 Known Bugs and Limitations

| Issue ID | Description | Workaround |
|----------|---|--|
| PC-001 | PIX Connect may freeze if multiple rapid triggers occur within 1ms | Implement minimum 100ms delay between triggers in OPC UA server |
| PC-002 | File renaming fails if PIX Connect output directory contains special characters | Use only ASCII characters in <code>PIXCONNECT_OUTPUT_DIR</code> path |
| PC-003 | Delayed snapshot sometimes misses exact timing when system is under heavy load | Reduce background processes during critical operations |
| PC-004 | SDK connection drops after Windows sleep/wake cycle | Restart application after system wake |
| PC-005 | First snapshot in new folder occasionally has wrong timestamp | Verify system clock synchronization |
| PC-006 | Measurement areas config settings reset when PIX Connect restarts | Re-apply measurement template after startup |
| PC-007 | "Untriggered" folder files may get processed twice during rapid state changes | Manually verify files before reprocessing |

Table 1: Known Issues and Workarounds

6.2 Version-Specific Issues

6.2.1 v1.0 (Current Release)

- **UI Lag:** Status updates may freeze during high-frequency triggers

6.3 Reporting New Issues

When reporting bugs, please include:

1. Exact time of occurrence
2. Relevant log snippets (last 50 lines)
3. Screenshot of error (if UI-related)
4. Steps to reproduce

Submit reports to: `faiza.waheed@th-rosenheim.de` with subject "[**Bug Report**] **Thermal-camera_Controller**"

6.4 Contact Information

For support contact:

Faiza Waheed <faiza.waheed@th-rosenheim.de>