## Report from Zeuthen Video PITZ report and plans Future plans



**TINE Users Meeting** 2020-10

**Stefan Weisse** 

## Simplified SGP[].xml and Raw2Jpeg[].xml



<CIniExWrap> <!-- This is only a documentation excerpt / example! -->

<ServerSettings> <Name>SRINT2.SGP</Name> </ServerSettings>

Video

<TineServerSettings> <Context>PETRA</Context> <ServerName>SRINT2.SGP</ServerName> <EquipmentModuleName>SGPJA1</EquipmentModuleName> <PortOffset>1</PortOffset>

<FecName>ACC10PESRV27.10</FecName> <FecDescription>SGP Jai SDK v3 (GigE, ...) SSC</FecDescription> <FecLocation>n/a</FecLocation> <FecHardware>n/a</FecHardware> <FecResponsible>Stefan Weisse</FecResponsible> <Subsystem>Video</Subsystem>

</TineServerSettings>

</CIniExWrap>

SGP[SRINT2.SGP].xml

- optional from 2020-09
- <TineServerSetting><ServerName> →
  <ServerSettings><Name>
- FecName: host name + '.' + PortOffset
- FecDescription, FecLocation, FecHardware, FecResponsible, Subsystem: default values shown left, hardcoded in server executable

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#### Video SGP\_Ebus

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- SGP\_Ebus: front-end video server to interface GigE Vision cameras via Pleora eBUS SDK v6 www.pleora.com
- for cameras that have been controlled via JAI SDK (discontinued)
  - PITZ, Petra (Diagnostic Beamline, E-Weg, SRINT2), Regae
  - Cameras by JAI, Basler, ... (**NOT Allied Vision Tech. / Prosilica**)
- runtime paid license needed (MAC-address, USB-Dongle), except JAI CMOS cameras
  - license cost: currently one-time paid (per MAC-address 200 US \$, per USB-Dongle 400 US \$)
- development finished, to be tested in production at PITZ end of this year, foreseen to be introduced to Hamburg in 2021
- in general not happy with price vs. robustness and difficulty of use (no updates, login needed), but no better option known





### Video Video Client 3: Crosshair (user-defined)

Application	Image Backgro	ound View Help	)								
loolbar	x-Scale (mm/px)		x RMS (mm) 0.000000	Normalization	Live Image Source: TV1S.Pros.2: Low.Scr2 (Full)	<b>.</b>	Switch	DAQ Discard		Side Panel	
Override Scale	y-Scale (mm/px)	<y> (mm) y 287.00000 (</y>	y RMS (mm) 0.000000	X-Ray Filtering	FF: Sum of Pixels 048,347,532.0 of 112,412,160.0 (4	43.009 %)	Poll Mode	DAOstart		Number of Im Width x Heigh	ages t 768 x 5
	Background empty	[ Brow	vse Individual Im	ages )	[ Integrated tine:/TEST/VIDCLN3_Nr1_at_z	Tine Server (Calculations)	] Enable	Snap Image Crosshair		Format Image Source	Gray8 EBitPF
0.60							Abor	Control of the second s	Added An/Offline Video Display and Ana 01 (Release-MoreOptimized), ders v5. 1.0, 0, 11 v5.2:5618 visse (stefan.weisse@desy.de) t2 (2003-2011): release for use with the PITZ exp rarts writen by izar miltchev@desy.de). zlib compression library. e/mcs/tine/VideoSystem/vsVide OK	CrossHair X position Y position Type Constraints Calculations M Threshold Minimum Size Normalization Mode X-Ray Filtering Percentage Number of CSV File Writi Delimiter Decimal Point Grab and Save Laser Shutter False Color M	->  -35.4    ->  1.74    st (AOI)  ->    Rectangular (I, t, r, b)    (0, 0, 767, 5    ode: Centroid CK
[12.10.2020 16	6:35:29:064] Switched	off calculations.						Polle	d/Dropped -/- (%)		

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defined)to outline target position

4 px

deocli

bit(s)

- useful for alignment
- requested by Mech-ZN and HH e-welding
- not released yet (testing...)

#### **Zeuthen PITZ report and plans**



- in general runs stable
- mostly Release 5 now (Release 4 still in operation on Java: Universal Slow Control (USC) server and some clients, Doocs servers / JDDD)
- TINE central servers (ENS, GENS, TIME server, Globals server) migrated to new host running Scientific Linux 7 (good for next couple of years)

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#### **Zeuthen PITZ report and plans**

#### • Java

- no Oracle Java any more
- OpenJDK 11 (installed via DSM) is used
- JDDD brings its own OpenJDK (v14.0.1 currently)
- lack of developer resources
- Jaka Webstart (JAWS) phaseout planned
  - future: local installations of applications, synchronized from network repository (for Windows an intermediate solution by Stefan is provided)
  - DSM?

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#### **Zeuthen PITZ report and plans**



- Windows: slow phaseout of Jaka Watchdog planned
  - to be replaced by Doocs Watchdog (Davit Kalantaryan)

- Archive System: March, PMarch, Archive Server
  - old installation on old host
  - no one has time to maintain it (...some volunteer?)
  - plan is to remove it

#### Future work SGP\_Vimba



## Allied Vision

- SGP\_Vimba: front-end video server to interface GigE Vision cameras via Allied Vision Technologies (AVT) Vimba SDK www.alliedvision.com
- for cameras that have been controlled via Prosilica PvAPI (discontinued)
- PITZ, FS-BT (Petra User Beamlines), Salome, EMBL Hamburg
- cameras: AVT Prosilica
- free of charge
- development not started yet, foreseen to be ready in 2021

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### Potential Future work Matlab support in Hamburg on Windows



- mcamatlab server (Terminal server, users working in parallel)
  - L:\system64 (in Path environment variable)
    - contains e.g. tine64.dll, tbufsrv64.dll, videosystem3-x64.dll
    - tine64.dll v4.5.9 5244 (file date year 2016: isn't it a little bit old?)
    - users are able to change, e.g. files and folder names
  - L:\MATLAB\MiddleLayer\Release\links\tine (in Matlab search path)
    - contains mexw64 files (Matlab external function) and .m files (Matlab script)
    - contains outdated versions of avine\_tine\_read\_images.mexw64 and avine\_save\_video\_images\_to\_file.mexw64
  - L:\MATLAB\StefanWeisse\

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• for Avine Video, a good set of mex files (and libraries beneath) have been provided (but user needs to know this and adjust Matlab search path)

### Potential Future work Matlab support in Hamburg on Windows



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- mcamatlab server
  - How to get to a consistent set of DLLs and MEXW64 files?
    - not changeable by users
    - updated regularly (e.g. on Windows Wartungstag)
  - Where can I put libraries / mexw64 files?
    - so that on subsequent updates of hosts, DSM packages etc. they are released?

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### Potential Future work Matlab support in Hamburg on Windows



- Folder structure to put MEX files and DLLs for Windows
  - By Facility (to allow step by step rollout)
  - Two folders (named release and test): overdesigned?

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$\leftarrow$ $\rightarrow$ $\checkmark$ $\uparrow$ $\blacksquare$ H:\public\avine-matlab-windows	→ 🗸 🖡 H:\public\avine-matlab-windows-libraries-DRAFT\petra\release					
avine-matlab-windows-libraries-DRAFT	Name	Date modified				
📕 petra	avine_load_video_images_from_file.mexw64	1/14/2016 6:05 PM				
release	avine_save_video_images_to_file.mexw64	3/8/2018 6:33 PM				
📜 test	avine_tine_read_images.mexw64	9/28/2017 3:58 PM				
📙 regae	tbufsrv64.dll	9/3/2020 10:29 AM				
l release	🔊 tine64.dll	9/5/2020 1:39 PM				
test	videosystem3-x64.dll	9/28/2017 4:20 PM				
6 items		>				

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### Potential Future work TINE kernel unload from memory



- Cleanup of Tine kernel maybe still needs improvement (e.g. when shared library is unloaded from memory)
  - a few years ago, full Matlab session was experiencing stochastic, delayed crashes, mainly on Linux
  - identified cause was cleanup (of Tine library?, of mex file's way to unload TINE library?), triggered by user calling in Matlab e.g. 'clear mex', 'clear all' to clean his workspace
  - introduced mexLock (Matlab API function call) to xcomm and avine\_tine\_read\_images
    - Mex file and its libraries are not removed from memory when e.g. clear mex, clear all are called by Matlab user
  - amout of Matlab crashes greatly reduced

### Potential Future work TINE kernel unload from memory



- Cleanup of Tine kernel
  - first step, if Stefan has time: perform tests (with disabled mexLock) to see whether cleanup problem still exists

#### Basler acA2440-20gm CMOS 2464x2056 (5 Megapixel) 12 bit - at E-Weg, at SRINT2

Video transport via TINE: UDP Multicast → TCP

- operation with handbrake: limit resultion by 2x2 binning (1232x1028 pixels)
- Problems

**Potential Future work** 

depth (> 8 bit per pixel)

- higher resolution than 2000x2000 pixels not supported in Java Video (Analysis Server)
- higher bit depth than 8 bits per pixel partly not supported in Java Video (Analysis part in AcopVideo and/or Analysis server)
- stable Multicast only possible for low bandwidth (few MB/s), requires time-consuming fine tuning

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# Roadmap to support higher resolution (more than 1.5 Megapixel) and higher bit-



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- Multicast is problematic, the higher the amount of packets
  - lots of packets per e.g. 10 MB video image (modern CMOS 5 Megapixel cameras already in use): 7124 packets (headers not included), at 10 images per second?
    - if one packet of a video frame is lost, full video frame is lost
  - Jumbo packets (i.e. 64.000 byte TINE PacketMTU) absolutely not recommended (can easily lead to IPv4 reassembly storm), packet size must be less than MTU (currently 1472 bytes)
  - only one multicast 'stream' per host IP, i.e. all servers on one hosts are combining their multicast-traffic, client needs to sort through

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### Potential Future work Video transport via TINE: UDP Multicast → TCP



- migration to TCP for higher bandwidths (more than a few MB/s) is the only option
- but 1 stream per client (at higher bandwidths few clients can easily fill the servers outgoing network bandwidth)
- 30-50 MB/s per video stream easily imagineable on Gigabit network
- if four clients want to get a stream at 50 MB/s, this means 200 MB/s network bandwidth is needed at server (but more than Gigabit bandwidth on server output is neither tested nor imagineable, or?)
- How to keep things under control (stable transmission)?
  - hand managed list of client Ips which are allowed to access property Frame.Sched?
  - each IP can receive the video stream only once?
  - users can query the server to see a list of clients for this property (lists currently receiving clients as well as clients which have been receiving in the last n (1?, 5?) minutes)?
  - ?

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```

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#### Thank you for your attention!

Questions?

Comments?

Remarks?

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