

TINE Video System

A Modular, Well-Defined, Component-Based and Interoperable TV System

Proceedings On Redesign $\rightarrow VSv3$

Stefan Weisse, David Melkumyan, Philip Duval DESY, Germany



Photo Injector Test Facility Zeuthen (2002 on)

 test, condition and optimize sources of high brightness electron beams for future free electron lasers and linear colliders

HELMHOLTZ

GEMEINSCHAFT

- goal: intense electron-beam with very small transverse emittance and reasonably small longitudinal emittance
- goal is requirement for FEL operation



"The challenge of PITZ is the production of such beams with very high quality by applying the most advanced techniques in combination with key parameters of projects based on TESLA technology like the <u>FLASH</u> and the <u>European XFEL.</u>"

ICALEPCS 2009

October 12-16



2000

2002

A Decade of History

ICALEPCS 2009 October 12-16

TINE Video System (HH)

PITZ Video System (Zeuthen)

pre-stage of VSv2

2003-2008TINE Video System 2 (VSv2)

- client/server architecture
- wrapping, encapsulation (for easier reuse)
- still in use (hybrid VSv2 / VSv3)

2003 installed at PITZ

2006 installed at DESY Hamburg ("DESY-2" and around)

installed at EMBL Hamburg

2008 (and on) TINE Video System 3 (VSv3)

- modular, component based, interoperable, well-defined, user-friendly
- step by step taking over

Stefan Weisse, DESY[MOD003] TINE Video System: Proceedings On Redesign



ICALEPCS 2009 October 12-16

- modular, component-based
 - each component should only do its primary purpose and nothing else (if not defeated by external influences)
- interoperable
 - interfaces to other control system protocols
 - interfaces to the "outside world"
- well-defined
 - specification separated from implementation (available as plain text files)
- use of standards where possible
 - PNG for video images
 - XML for configuration (files): speaking names, self-explanatory, commented
- user-friendly, multiplatform
 - main components are Windows (server) and Java-based (client, server)
 - by rule: C++ sourcecode does not contain much platform dependency
- while still keeping it
 - easy to use, capable of high-performance, low-latency, lossless if necessary









- hardware-independent pre-٠ processing of video data (if necessary)
- can run as companion right • beside SGP
- takes live video from component in front
- performs tunable pre-processing
- provides 3 different output interfaces, including support for old-style clients



Universal Slow Control



- more general approach of slow control
- user/expert view on camera properties
- well-defined, separately • documented TINE property interface
- subset: Generic Slow Control
- native Java server and rich Java client, TINE communication
- abstract design: control of other devices than cameras can be considered



Universal Slow Control Client

😳 Universal Slow Control				
File View Help				
Connection Group: Device SlowConLaser V Strea	a: kCamRoom 💌	Description: Streak camera room		Mode
Name	Description		Readback Value	
EScanMode	Scan Mode		Non-Interlaced	
ETriggerMode	Trigger Mode		External	
EGainMode	Gain Mode		Manual	
IAutoGainLevel	IAutoGainLevel AutoGain Leve		194 a.u.	=
IWhiteClipLevelCh1	WhiteClip Level	l Channel1	165 a.u.	
ISetupLevelCh1	ISetupLevelCh1 SetupLevel Ch/		100 a.u.	
IManualGainLevelCh1	IManualGainLevelCh1 ManualGain Lev		90 a.u.	
FGain	Generic Manua	lGain Level Channel1	90.0 a.u.	×
Details	visible by User	unavailable 🗌] not-writable by User	A generic
Value: Non-Interlaced			~	Apply
Setpoint: Non-Interlaced				
Default: Non-Interlaced				
Done				12:29:41

- rich Java client application
- TINE for control communication
- Java Web Start
- default GUI for general access to camera slowcontrol, fitting user and expert needs

runs where Java 6 is available (verified Linux, Windows)

Stefan Weisse, DESY[MOD003] TINE Video System: Proceedings On Redesign

ICALEPCS 2009 October 12-16



ACOP Video Bean

ICALEPCS 2009
October 12-16

🕌 ACOP Video Aj	pplication						
0 1	2	3	4	5	6	7	_
Source: FakeImageSource (IMAGE_FORMAT_GRAY)# 37174 - 16:24:53.3Size: 768 px * 574 px * 8 of 8 bpp (AOI: none)Drop: 4 (0,471)					277 1%)		
					Prefer Captur Info Start Stop	ences re screen	
Format: IMAGE_F Flags: LITTLEEND	ORMAT_GR DIAN LOSSI	AY LESS				Rotation: 0,	00°
Connection							
Address: /TEST	/SGP_FAKEI№	1AGE/Outp	out/Frame.Scl	hed] 🌗		
Configuration						Save As PNG	
Color: GRAY:	SCALE 🔽		Zoom				
Zoom: AUTO	*	🔽 Кеер	Aspect Ratio	1			
Overlay: AUTO	*	Norm	alization				

- rounded corners based on user feedback
- compatible to COMA
- interface was added to intermediate analysis server*
- stable, mature
- development is continued (commissioning phase)

* work done by Cosylab

Stefan Weisse, DESY [MOD003] TINE Video System: Proceedings On Redesign



ACOP Video Bean + jDDD



Stefan Weisse, DESY[MOD003] TINE Video System: Proceedings On Redesign





Final emittance value and intermediate data can be measured much quicker, requiring less user-interaction and attention by operators

- user-friendly multiple window interface
- supports semi- and full-automatic operation while control by hand is retained

🗙 Expert center	🗙 Video center 🛛 ? 💶 >	ion center ? . X
[+] Expert control	_[+] Video Control	tyles
O GLOBAL ERROR present?	[+] Video Buffer	Font Set Palette Debug: 0-All, 9-Stop
O Doocs WRITE functions blocked?	BigVideo Normalization 🕱 Spectrum	Windows 🔻 8
• SERVER online?	Relnit of V.Sys. OK!	
CONFIG FILE present?	FPS = 4.17 frame/sec 10%	hput-
AUTO Scroll on/off	znppitzfg4.ifh.de 20%	
EXPERT mode on/off	High1.Scr5 (f160) width = 512	0.000 0.000 0.000
O SHUTTER status (ON-open; OFF-close)	height = 680 - 40%	
Init of Video System	bpp = 1650%	oster
Video Server is ready	norm.koef = 0.36	Mean, [MeV/c] RMS, [KeV/c] Fref, [deg]
🔘 Is Scan thread lived	sign.summ = 3003	
Shutter (ON-don't use/ OFF-use)	max.value = 704(4096) max.value = 17.19 %90%	er beam:
Low: 66 X Monitor center	2 X % 100%	formation
267) S [+] DOOCs monitor	(i) Emit	tance Measurement Wizard
269) P Gradient, [MV/m] T, [C] Power, [MW]	IMain, [A]N puls	ase 3.1.3 apiled on 03.06.2009
-Middle:	YAG Slit 10 um Desi	gn: L.Staykov -Background
13591) Set new video Server =>: value= 4.00	<u> </u>	BKG BKC
13602) Set new video Server =>; value= 5.00	trom =>	
		onfig center 2 X
High: 242; max(500)	EMSY1 Axis Actuator position, un	
1 3925) Threed status: Mn GylGs Sc Es	Shutter status	Save Load Delete 0 um slit To 50 um slit
13927) Threed status: Mn Gv Gs.Sc.Fs.	ON-open/OFF-close	
13930) Threed status: Mn.Gv.Gs.Sc.Fs.] Click Config Storage
	X Emittance Measurement System - EMSY	Compared to the second se
X EMSY Spectrum: BG(97.4); <50%(2.6); 50-70	[x] Main panel	L Reserved
5% < <50%: 100.00 50-70%: 0.00 >70%: 0.00	Control Options Info Video Monitor Expert	ON ON
940 30% 50% 70%	Set folder name	Data handling
784	Sug pame	OM 60000 um 🔶 🛛 💆
62 <u>7</u>		
470	Set Video Server for Scan&Grab	
	6) znppitzfg4.ifh.de => CAM(High1.Scr5 (f160))	L8 50 um 🖨 Analysis
159		10 frames 🚔 Reserved
	100% About Config Set Safe mode	Exit
0 572 744 1117 1489 1861 2234 2606 2978 53	Mn.Gv Gs.Sc.Fs. Video server #5 is selected for source	

PITZ Emittance Measurement Wizard

Stefan Weisse, DESY



- effort has been made to provide strong figures
- on *clean* Gigabit Ethernet network installation
 - at least **30** MB/s of throughput, also verified to work with multicasting
 - video frame size from few kB to **3** MB verified
 - frame rate from 1 Hz to **30** Hz
 - all that with less than 1 frame drop per minute
- on tuned state-of-the-art setup
 - 50 MB/s, 45 frames per second with less than 1 framedrop per minute
 - these rates cannot be guaranteed, though (yet?)
- our target is nonetheless still higher, work in progress



Standard Image Format PNG

- storing of video images/image sequences to disk and loading them back in
- past: proprietary, loss of metainformation, different styles for grayscale / colour
- PNG was chosen as format (also TIFF and JPEG were considered closer)
- flexible specification created
 - exported to png (postprocessed for presentation)
 - saved as png (no postprocessing, lossless 100% also header and metadata)
- well-defined container for image sequences: PNGZIP (own development) is designated







ICALEPCS 2009 October 12-16



- PITZ
- PETRA III pre-accelerator control
- HASYLAB (Hamburg)

 PETRA III-based experiments
- EMBL Hamburg

 transition to VSv3 is planned
 (VSv2 was used on earlier installations)
- You?



- Already in the pipeline
 - finishing of core components of VSv3 (Core Provider, Video Service)
 - evaluation of XMP as metadata saving standard for PNG file
 - finishing PNGZIP image sequences standard document and reference implementation for C++ / Java
 - move PITZ to full VSv3 setup on server-side
- Planned
 - unleashing the full power of Gigabit Ethernet for video transmission
 - continue to move client-side to Java
 - provide flexible, user-friendly APIs on many platforms
 - GenICam SGP component?



ICALEPCS 2009 October 12-16

Thank you for your attention!

S? Comments?

Questions?

stefan.weisse@desy.de david.melkumyan@desy.de philip.duval@desy.de

http://tine.desy.de

Stefan Weisse, DESY [MOD003] TINE Video System: Proceedings On Redesign Page 16