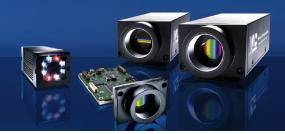
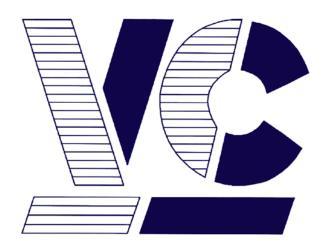
Smart Cameras made in Germany





Vision Components

The Smart Camera People

VC Smart Camera QuickStart in 10 Steps

Revision 1.2 – 29 Jul 2014 Document name: QuickStart_VC.pdf © Vision Components GmbH Ettlingen, Germany

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W W W . V I S I O N - C O M P O N E N T S . C O M

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PART I A QUICK START

1 Software overview

Thank you for using a VC Smart Camera! This guide will help you get started as quickly as possible with your new product.

For programming VC Smart Cameras the following **Software Tools** are needed:





On the PC	On the camera
Texas Instruments Code Composer Studio v6	Vision Components VCRT Operating system
& Code Generation Tools	(already installed on the camera)
IDE & C/C++ Cross Compiler	
Vision Components VCRT library	
OS C library	
Vision Components VCLIB	
Image processing C library	
Vision Components Extension Lib, Color Lib,	
Smart Finder, Smart Reader	
Additional & optional image processing	
libraries	

This manual describes how to:

- get and install the necessary software
- establish communication with the camera
- **compile** and run camera programs.



This guide describes the **installation with CCS v6**, for versions 3.x and 4.x check the older Getting Started document! For version 5.x check the previous version of this document. CCS v6 can be installed together with CCS v3/v4/v5 if one of these is already installed.

2 Creating a new account on the VC website

 To access the download center on the Vision Components website it is necessary to register on this page: http://www.vision-components.com/en/service/register/. After registration it is possible to download the hardware and software documentation.

ome		 Please fill in the information of your membership. Please make sure that you fill in your details for the fields marked * 		
ompetences	T lease make sure that yo	— Frease make sure that you infinit your details for the neids marked		
olutions	Mr/Ms:	⊙Mr OMs		
oducts	First name *			
ews & Events	Last name *			
rvice & Support	Title			
	Company			
	Address			
	City			
	Country	Germany		
	Postal code			
	Telephone			
	Fax			
	E-mail *			
	Receive HTML e-mails?	\checkmark		
	Web site			
	Password *	Repeat		

VC registering page

 To be able to download the libraries and other software, the VC licence code(s) (full licence or loan licence, can be found on the invoice) must be registered here: http://www.visioncomponents.com/en/service-support/download-center/software-request/.

Home	Software Request Name*
Competences	Name
Solutions	Loïc Burner
Products	Company*
News & Events	
Service & Support	VC
Contact	E-Mail-Address*
Download-Center	
Documentations	support@vision-comp.com
Software	License Key*
Software Request	T1122334455
Tech News	
Knowledge Base/FAQ	Software Product*
Return/Repair Service	VCLib
Loan Systems	
Logout	

Software request

- The main licence code (VC SDK-TI, for using the VCLib and the VCRT Lib) is under the form T1122334455 or LT1122334455 and is necessary for programming. See part II, chapter 2 for more details.
- 4. After a short time you will receive a confirmation email from us and the access to your software downloads will be activated (depending on the licence codes you registered).

You are here: Service & Support / Download-Center / Software

Home	Your software download
Competences	
Solutions	On the following pages we activated your software files. You find this pages via the ma navigation or by clicking the following links:
	navigation of by clicking the following links.
Products	<u>VC Libraries</u>
News & Events	 VCRT Camera Operating System
Service & Support	<u>VC nano 3D Software</u>
Contact	<u>VC Demo Programs</u>
Download-Center	<u>Software Utilities</u>
Documentations	OpenCV
Software	Please fill in the software request form, if the software you wish is not available
VC Libraries	here. Thank you!
VC Camera OS	Software request
VC nano 3D	
Demo Programs	Please fill in the software request form to access your software download. Please find
Software Utilities	the required licence code in your shipping list.
OpenCV	
Software Request	
Tech News	
Knowledge Base/FAQ	
Return/Repair Service	
Loan Systems	

Software download page

N.B. The user name is always the email address!

Logout

3 Connecting the camera



- Connect LAN cable, Power/PLC cable (or directly power supply) and if available VGA cable on the correct connectors. The LAN cable must be connected to the PC through a switch or a cross cable.
- 2. If your camera does not have a VGA output, live images can be transferred using our image transfer demo, check **the last chapter** of part I.
- 3. Depending on the camera model you can connect the **Trigger / RS232 cable**, if you want to test these interfaces.

A detailed hardware documentation for each camera series, including description of the connector pins, is available on the VC website: http://www.vision-components.com/en/service-support/download-center/documentations/hardware-dokumentation/ (link active after registration and login).

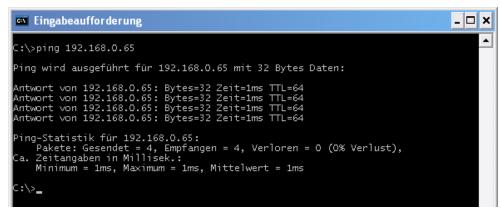
4 PC TCP/IP settings

- 1. All VC Cameras have the IP address 192.168.0.65 at delivery.
- 2. Therefore, set the PC IP address to a **compatible address** e.g. 192.168.0.20, subnet mask 255.255.255.0.

Eigenschaften von Internetprotokoll (TCP/IP) 🛛 🥐 🔀				
Allgemein				
IP-Einstellungen können automatisch zugewiesen werden, wenn das Netzwerk diese Funktion unterstützt. Wenden Sie sich andernfalls an den Netzwerkadministrator, um die geeigneten IP-Einstellungen zu beziehen.				
O I <u>P</u> -Adresse automatisch beziehen				
• Folgende IP- <u>A</u> dresse verwenden:				
IP-Adresse:	192.168.0.20			
S <u>u</u> bnetzmaske:	255 . 255 . 255 . 0			
<u>S</u> tandardgateway:	· · ·			
○ D <u>N</u> S-Serveradresse automatisch b	peziehen			
• Folgende DNS-Serveradressen verwenden:				
Bevorzugter DNS-Server:				
Alternativer DNS-Server:	· · ·			
	Erweitert			
OK Abbrechen				

TCP/IP settings under Windows XP

 You can test the connection, by sending a ping command to the camera ("ping 192.168.0.65") from the command line. If the camera does not respond, refer to the communication troubleshooting chapter.



Ping command under Windows command line

5 Connecting to the camera shell

- 1. For a first hands-on, we will now establish a connection to the user interface of VCRT: the camera shell.
- Download the terminal program TeraTerm from the following website: http://en.sourceforge.jp/projects/ttssh2/releases/. Install the program. You can also use another terminal program of your choice.
- 3. Connect to the camera on the telnet port 23:

Tera Term: New connection				
® TCP <u>/I</u> P	Service: (192.168.0.65 ☑ Hist <u>o</u> ry ◉ Te <u>I</u> net ◎ <u>S</u> SH ◎ Other	TCP port#: 23 SSH version: SSH2 v Protocol: UNSPEC v	
© S <u>e</u> rial	Ро <u>г</u> t: (ОК	COM1: Comn Cancel	nunications Port (COM1) 👻	

TeraTerm connection dialog

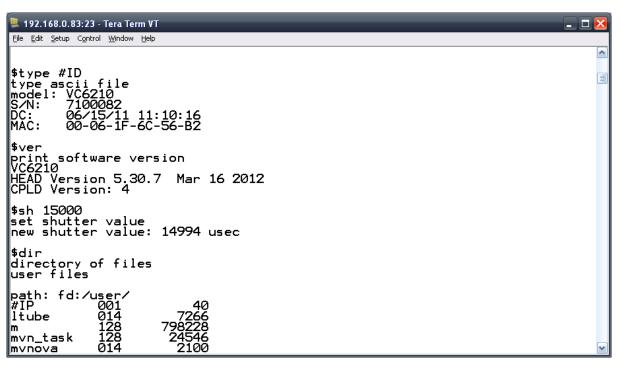
4. You are now connected to the camera shell.



VCRT: the camera shell

5. Some camera functions are available directly from the shell; in the table below are some examples. The execution of shell commands must be confirmed with <Return>.

Function	Command
Program execution	\$programname
Upload programs from the PC to the camera	\$lo <activation function="" of="" td="" the="" the<="" upload=""></activation>
flash memory	terminal program>
Show files on the Flash (SD card)	\$dir (\$dir md:/)
Delete a file	\$del filename
Pack flash memory (physically erases	\$pk
previously deleted files)	
Take a picture	\$tp
Save an image as a bmp file (or jpeg file)	\$bs imgname (\$js imgname)
Switch image capture to "still" (live) mode.	\$vd -d (vd -l)
Change shutter time	\$sh <value in="" microseconds=""></value>
Show VCRT version	\$ver
Show the contents of a text file	<pre>\$type filename (for example \$type #ID)</pre>



Examples of shell commands

The full commands list can be displayed using the command "help". A full description of the commands is available in the VCRT documentation (http://www.vision-components.com/en/service-support/download-center/documentations/software-dokumentation/).

6 Downloading and installing Code Composer Studio v6

1. Create a user account on the TI website: www.ti.com/hdr_my_ti

TI Account		
Existing user? Log in here:	New user? Register for free:	* Required
our email address: our my.TI password:	It's quick and gives you access to free samples, TI's E2E Co reviews and personalized recommendations.	
	Your country/region: - Select a Country/Region Your email address:	-
Remember me 😨	* Tour email address: * Create a my.TI password:	
orgot your password?	* Confirm password:	
	* First name:	
	* Last name:	
	* Your company name:	
	🗹 Remember me 🕜	
	I would like to receive personalized information by email	from TI.

TI register page

 After logging in, follow this link to download Code Composer Studio v6: http://processors.wiki.ti.com/index.php/Download_CCS

Always download the latest CCS (indicated at the top of the page, currently 6.0.1).

Main Page All pages All categories Popular pages Popular authors Popular categories	Page Discussion Download CCS
Recent changes Random page Help • Print/export Create a book Download as PDF Printable version • Toolbox	Contents [hide] 1 Download the latest CCS 2 Code Composer Studio Version 6 Downloads 3 Code Composer Studio Version 5 Downloads 4 Code Composer Studio Version 4 Downloads 4.1 Image Descriptions 4.2 CCSV4 Release Archive 5 Code Composer Studio Version 3 Downloads 6 Code Composer Studio Version 2 Downloads 6 Code Composer Studio Version 2 Downloads 6 Code Composer Studio Version 2 Downloads Download the latest CCS Image Version 6.0.1.00039 Release Notes IP Linux Installation Instructions The above buttons will take you to a form that once complete will download a small installation program. A MyTi login is required to fill out the of CCS that you want to install and then will download and install just those items. Full zip images 'are available if you have issues with the generate a free license that works with XDS100, development boards with onboard debug or for MSP430 users a 16KB code size limited lic CCSv6 page for device support information.

TI CCS download page

- 3. Unpack the downloaded file and execute the setup file (if needed with administrator rights under Windows).
- 4. In the Installation Location dialog set the desired install folder. For simplicity we choose C:\ti.

😯 Code Composer Studio v6 Setup	×
Choose Installation Location Where should Code Composer Studio v6 be installed?	
To change the main installation folder click the Browse button.	
CCS Install Folder	
c:\ti	Browse
Texas Instruments	
< Back Next > Finish	Cancel

5. In the **Processor Support** dialog **C6000 Single Core DSPs** and **Media Processors (DM, DA)** are needed:

🤫 Code Composer Studio v6 Setup			
Processor Support Select Product Families to be installed.		Description	
 32-bit ARM MCUs Sitara 32-bit ARM Processors Media Processors Integra Device Support OMAP3 and OMAP4 Device Support Media Processors (DM, DA) Device Support TI ARM Compiler TI C6000 Compiler GCC ARM Compiler GCO Single-core Device Support C55x Device Support TI C6000 Compiler TI C6000 Compiler C55x Device Support TI C55x Compiler TI C55x Compiler Multi Core Processors 	E	Description C6000 TI Compile Tools and documentation	
Select All		Install Size: 854.12 MB.	
Texas Instruments	< Back	Next > Finish	Cancel

6. In the **Select Emulators** dialog uncheck all emulators if possible. Then click Finish and wait for the installation process to end. Do not run CCS yet.

Code Composer Studio v6 Setup	
Select Emulators Select the emulators you want installed and deselect leave out. ITI XDS560 PCI Emulator XD5100 Class Emulator Support XDS200 Class Emulator Support Blackhawk Emulators Spectrum Digital Emulators and Boards	t the emulators you want to Description Installs support for all XDS100 class emulators.
☐ SelectAll	Install Size: 854.12 MB.
Texas Instruments	Next > Finish Cancel

For maximum compatibility it is necessary to use the **Code Generation Tools version 6.0.31**. This version can be downloaded on the following TI page: https://www-a.ti.com/downloads/sds_support/TICodegenerationTools/download.htm.

Scroll down until version 6.0.31.

Do not use the Code Generation Tools 7.x (which are installed with CCS v6), these versions have not yet been approved by Vision Components!

6.0.× Releases		
C6000 Code Generation Tools v6.0.31 [Windows] [Linux] [Solaris]	<u>Release Notes</u>	Apr-27-2012. Bug fix update.
C6000 Code Generation Tools v6.0.30 [Windows] [Linux] [Solaris]	<u>Release Notes</u>	Jan-30-2012. Bug fix update.

CG Tools download page

- 7. Download the setup file.
- 8. Choose **Typical** installation.

C6000 Code Generation Tools Setup	×
Setup Type Select the setup type that best suits your needs.	44
Click the type of Setup you prefer.	
Typical	Description
Custom	A typical installation.
Texas Instruments	Next > Cancel

9. Choose the **same installation folder as CCS** (in our example **C:\ti**). Then click next until the installation starts.

C6000 Code Generation Tools Setup	×
Choose Destination Location Where should C6000 Code Generation Tools be installed?	Ų
Setup will install the C6000 Code Generation Tools v6.0.31 in the following folder.	
To install to this folder, dick Next. To install to a different folder, dick Browse and select anoth folder.	her
Destination Folder	
C:\ti	
Texas Instruments	
< Back Next > Cano	:el

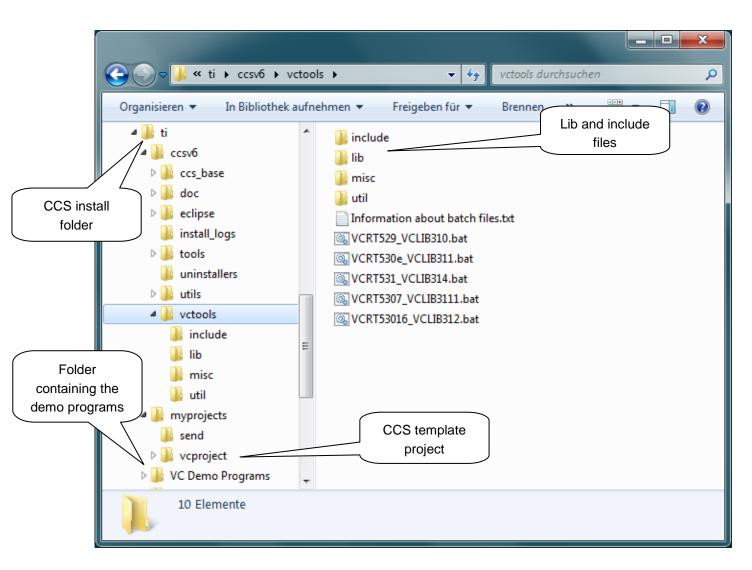
7 Downloading and installing VC Libraries

- Download the library setup file from this page: http://www.vision-components.com/en/servicesupport/download-center/software/vc-bibliotheken/. The setup file is under the form VCRT_5xx_VCLIB_3xx_CCS6_Setup.zip, where 5xx and 3xx are the current versions of the VCLIB and VCRT libraries.
- To install the libraries unzip the setup file VCRT_5xx_VCLIB_3xx_CCS6_Setup.exe and execute it. Choose the same install folder as for the Code Composer Studio installation (in our example C:\ti)!

🔂 Setup - Vision Components PC Libraries for Smart Cameras with TI D		
Select Destination Location Where should Vision Components PC Libraries for Smart Cameras with TI DSP be installed?		
Setup will install Vision Components PC Libraries for Smart Cameras with TI DSP into the following folder.		
To continue, click Next. If you would like to select a different folder, click Browse.		
C:\ti Browse		
At least 11,4 MB of free disk space is required.		
< <u>B</u> ack Next > Cancel		

VC install setup

 The setup file also installs a number of example C programs as well as a template project for CCS v6 (containing all necessary compiling options) for an easier start in programming VC cameras. 4. The installation is now complete, the install folder looks about like this:



You are now ready to start CCS and compile programs!

8 Starting and configuring Code Composer Studio v6

- 1. Start Code Composer Studio v6.
- 2. A dialog appears, asking for a workspace: this is where all your CCS projects will be saved. Default is **C:\ti\myprojects**, where the VC template project was installed.

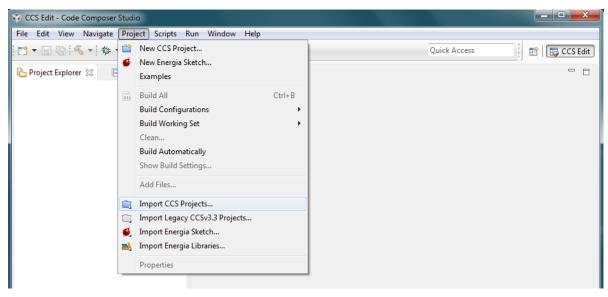
🐨 Workspace	Launcher	
Select a wo	rkspace	
	oser Studio stores your projects in a folder called a workspace. orkspace folder to use for this session.	
<u>W</u> orkspace:	C:\ti\myprojects	- Browse
🔲 <u>U</u> se this a	s the default and do not ask again	OK Cancel

CCS workspace selection

3. You can close the Getting Started tab.

9 Compiling a program with CCS

 First the CCS template project provided by VC must be imported. In the "CCS Edit" perspective (top-right corner) select menu Project → Import CCS Projects.



CCS window

2. In the dialog, browse to the myprojects folder (in our example C:\ti\myprojects). The template project appears in the list, confirm with **Finish**.

🔅 Import CCS Eclipse Projec	ts	
Select CCS Projects to Im Select a directory to search	port for existing CCS Eclipse projects.	
 Select search-directory: Select archive file: 	C:\ti\myprojects	Browse
Discovered projects:		
Vcproject 📄		Select All Deselect All Refresh
Automatically import <u>r</u> ef	erenced projects found in same search-directo	ry
<u>Copy projects into works</u>	pace	
Open the Resource Explorer	and browse available example projects	
?	<u> </u>	Cancel

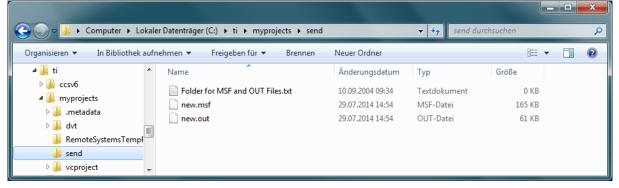
CCS project import

 The project appears in the left column, with the sample source code hello.c (a simple "Hello World" printout). To compile, click on the **Build** button in the tool bar.

😳 CCS Edit - vcproject/hello.c - Code Comp	oser Studio		
<u>File Edit View Nargan Project</u>	ipts <u>R</u> un <u>W</u> indow <u>H</u> elp		
📬 🕶 🖵 🕼 i 🗞 🕶 🛷 🕶 🗉	** * * *	Quick Access	😭 🕞 CCS Edit
🎦 Project Explorer 🛛 🗖 🗖	i hello.c ☆		
 ↓ vcproject [Active - Release] ↓ Binaries ↓ Bincludes ↓ Release ↓ ccr.cmd ↓ hello.c 	<pre>25 26 void main(void) 27 { 28 29 /***********************************</pre>	S */ */ _licence("LT1122334455") */ _licence("LE1122334455") */ _licence("LC1122334455") */ */ , -5 otherwise */ */ */ */ */ */ */ */ */ */	
	4		
	E Console ⊠	Problems 🛛 0 items	
	for TMS62Cxx systems	Description	*
	file name: new scvt version 2.0 - win32 1 Datei(en) kopiert. 1 Datei(en) kopiert.		
	**** Build Finished ****	₩ ▼	+
Free License 🕴 👺 vcproject		i i	

Building a CCS project

- 4. Note the licence number initialisation with the function init_licence(), this is necessary for using the library functions. The warning ">> warning: entry point other than _c_int00 specified" is normal.
- The program is compiled and saved in the Send folder under myprojects (in our example C:\ti\MyProjects\Send): 2 files (.out and .msf) for two types of upload.



Send folder

6. The executable file can now be uploaded to the camera.

17

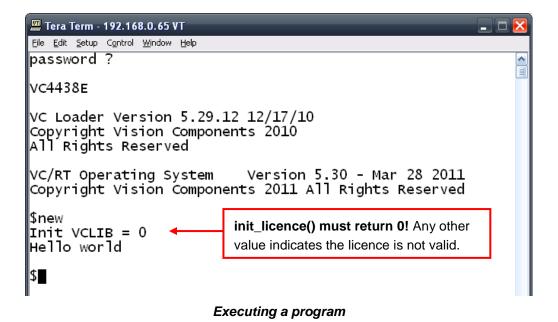
10 Uploading programs on the camera

- 1. The easiest and fastest way to upload the compiled program (or any file) to the camera is FTP transfer:
- Connect to the camera with an FTP client (for example Total Commander: http://www.ghisler.com/download.htm), using the camera IP address and port 21.



Under **Windows 7**: if the communication does not work, it may be necessary to unblock your FTP client in the Windows firewall!

- 3. Upload the file (in our example **new.out**) to fd: (flash memory) or md: (SD card).
- 4. Connect to the camera with the terminal program like in chapter 3 and execute the program.

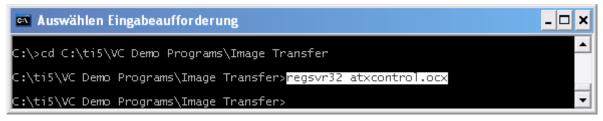


- 5. Alternative upload: execute shell command load "\$lo <Return>".
- In menu "File-> Send File" choose the file "new.msf" in the send folder "c:\ti\MyProjects\Send".
- 7. Execute program "new".

11 Bonus step: TCP/IP image transfer

VC's most recent smart cameras (e.g. the **VC nano series**) do not have a video output, instead live images must be transferred to a PC via TCP/IP.

- The image transfer package can be found in the VC Demo Programs folder which is installed with the library setup. Or you can download the Image Transfer zip file from the VC website (http://www.vision-components.com/en/service-support/downloadcenter/software/software-utilities/).
- 2. Upload the image transfer program img2b.out (TCP/IP server) to the camera using FTP.
- 3. Install the client program on the PC by registering the ATXControl control in the windows command line with "**regsvr32.exe atxcontrol.ocx**". On Windows 7 execute cmd.exe with administrator rights!



Registering atxcontrol.ocx

- 4. On the camera, run the program img2b in the background with the command "img2b &".
- 5. Set the camera in live mode using the command "vd -I".

🕮 Tera Term - 192.168.0.65 VT	
Eile Edit Setup Control Window Help	
password ?	
VC4438E	
VC Loader Version 5.29.12 12/17/10 Copyright Vision Components 2010 All Rights Reserved	
VC/RT Operating System Version 5.30 - Mar 28 2011 Copyright Vision Components 2011 All Rights Reserved	
\$img2b & #65547	
\$	
Fast Ethernet port 2002	
\$vd -1 video modes live \$∎	
1	

Executing image transfer program in TeraTerm

6. Start the ATXClient program and enter the correct parameters (IP address of your camera under **Server IP**, resolution under **DX and DY**). Check the box "live mode" to get continuous images.



7. Click on "Get Image" to start the image transfer.

The ATXClient program. Parameters set for a full frame on a VC4438E camera.

PART II ADDITIONAL INFORMATION

1 Description of the software

1. TI Code Composer Studio v6 IDE & C/C++ cross compiler

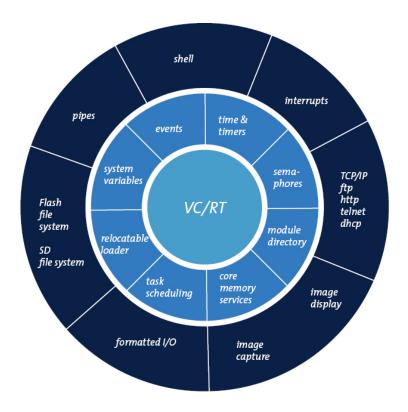
Code Composer Studio (CCS) is a comfortable graphical development platform for programming Vision Components Smart cameras. Following these installation instructions allows quick creation of camera programs based on the predefined project template that already include all settings necessary.

2. Vision Components VCRT Smart Camera operation system

VCRT is a purpose developed real- time, multi- tasking operating system that fully utilizes the calculation performance of the latest Texas Instrument DSPs.

The main features are:

- Interrupt driven, jitter free background image acquisition (hardware or software triggered)
- Image acquisition, transfer and processing possible in parallel.
- Handling of all camera communication and IOs
- Programmable input and output lookup table
- Memory management for flash, DRAM and MMC / SD
- Shell environment for controlling the main camera functions



Refer to the VCRT5 documentation for further reference on the VCRT operation system functions.

3. VCRT operation system function library for PC

The VCRT PC library includes all main camera functions that are not image processing functions:

- Image acquisition functions
- Video Control Functions
- Memory allocation functions, DRAM access and flash functions
- IO functions
- RS232 / Telnet functions, TCP/IP functions
- System variables

Included further are a range of utility functions. Refer to the VCRT5 documentation for further reference. This document also details the shell functions available for controlling VC cameras.

4. VCLIB image processing library for PC

The VCLIB includes the extensive range of image processing functions available for VC cameras – for instance:

- Macros simplifying the processing and display of captured images
- Functions for processing grey scale images
- Functions for processing and evaluating binary images
- Graphics functions for adding graphics and text to image or overlay

5. Additional image processing libraries for PC

In addition to the standard VCLIB, VC provides other image processing libraries. See the list in the next chapter.

2 Licensing

- 1. In addition to the standard license (**VC SDK-TI**, for using VCLIB + VCRT Lib), Vision Components also offers special libraries:
 - VC Extension Lib (new Extension Lib with a range of additional functions)
 - VC Color Library (Color Library for Bayer to RGB / HIS conversions and more)
 - VC Barcode Reader Library (1D Barcode Reader Library different standards)
 - VC Smart Reader Library (ECC 200 Data Matrix Reader Library)
 - VC Smart Finder Library (Contour-based Pattern Matching)
 - VC Solar Solution (Solar Wafer Measurement)
 - VC nano 3D Library (for VC nano 3D triangulation sensor)

Each library is available for download after registration of a valid license key as described above.

- 2. Vision Components issues two types of licenses:
 - *License for VC SDK-TI, Extension Lib, Color Lib.* This type of license is without runtime, and can be used indefinitely with the library versions your purchased and also with newer versions. Vision Components may charge an update fee in case of an important update.

The following licenses are available:

License Number Prefix	License Type Description
Т	Full License of VC SDK-TI (VCRT and VCLib)
LT	Evaluation license, valid for a limited time only

License Number Prefix	License Type Description
C, LC	Full and evaluation Color Lib licenses
E, LE	Full and evaluation Extension Lib licenses

- Single license for Smart Finder, Smart Reader, Barcode Reader, Solar Solution and nano 3D library. In this case a license per camera is needed.

For each license type, evaluation licenses are also available (fully-featured but time limited).

3. All special libraries require initialization within the camera program code prior to using its functions.

4. **Initialization** is done calling the **init_licence()** function using the corresponding license code as shown below:

```
void main(void)
{
    /* Initialize VC Licenses*/
    /* initialization of full VC SDK-TI license*/
    print("Init VCLIB = %d\n", init_licence("T1122334455"));
    /* initialization of an evaluation Color Lib License */
    print("Init VCLIB = %d\n", init_licence("LC1122334455"));
}
```

Function description (also refer to Color_Lib.pdf - Color library for VC cameras Version 3.0):

<u>``</u>	init_licence	initialize license code				
!	synopsis	I32 init_licence (char *code)				

Please always check the return value of the function init_licence: the function returns 0 if the licence is valid, -5 if the licence is not valid.

Checking the return value is important: if the licence if not valid, some functions simply will not work, without any error message.

Single licenses (Smart Reader, Smart Finder and Solar Solution) are under the form of two codes which have to be initialized in the source code. Refer to the documentation of the libraries.

3 Description of the CCS settings and compiler options

This section describes the compiler and linker options necessary for compilation. Note that the illustrations correspond to the CG Tools version 6.0.28 or 6.0.31. For versions 6.1.x for example the menu items will differ but the necessary settings stay the same.



Note: the paths used in the template project file (for example include and lib folders) use the CCS macros (for example "\${CCS_INSTALL_ROOT}" for the install folder, etc.), to make compilation independent from the CCS and VC libraries install folder.

3.1 General settings

Right-click on the project and choose "Build Options...". Click on "General" in the left column. For compilation with a VC4XXX or VC64XX camera, the following general settings are needed:

- Device Variant: Generic C64XX device
- Compiler version: version 6.0.31 (if the version doesn't appear in the list, click on "More..." and in the dialog indicate the CGTools installation folder)
- Linker command file: ccr.cmd
- Runtime Support Library: from VCRT 5.29, the rts6400.lib is supported for compilation with C64xx processors. But as it's already linked in the linker command file (ccr.cmd), the field has to be empty!

Properties for vcproject	General	Processor : C64 and VC64x		X - · ×
General Build C6000 Compiler Assembler Options Default File Extensions	Configuration: Release [Active]		Manage Configurations
Directory Specifier File Type Specifier General Options Library Function Assumptic Optimizations Parser Diagnostics Options Parser Options	Main Output type: Executable Device Eamily: C6000			
Parser Preprocessing Optic Runtime Model Options Symbolic Debug Options C6000 Linker General Options	Variant: <select fi<br="" or="" type="">Connection: ✓ Advanced settings</select>	lter text>	Generic C64xx Device	(applies to whole project)
CG Tools version	Device endianness: little Compiler version: TI v6 Output format: legac	.0.28 y COFF		More
Linker command file	Linker command file: ccr.cc Runtime support library:	nd		Browse
Show advanced settings		Version RTS Lib be en	o, must	Restore Defaults Apply OK Cancel

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3.2 Compiler settings

The most important compiler settings are:

- include file search paths
- interrupt threshold: The advanced compiler setting "-mi100000" sets the interrupt threshold to 100,000 cycles, defining the maximum frequency interrupts are queried. Omitting this setting can speed up some functions significantly. However in this case it is important to ensure that inner loops perform less than 100,000 cycles, as interrupts (e.g. timer) can be out of sync otherwise. The "Code Optimization" document, part of the "Advanced Programming Seminar" covers the speed optimization of programs in detail.

3.3 Linker settings

The most important linker settings are:

- relocatable output module: relocatable code is now standard, it brings more comfort for the user because VCRT manages program loading in memory automatically (whereas with absolute linked code, memory address of the program has to be taken care of). For more information have a look at the VC Programming Tutorial
- library search paths

Properties for vcproject	Produce relocatable code	Change program name
type filter text	General Options	
- General - Build - C6000 Compiler - Assembler Options - Default File Extensions - Directory Specifier - Compiler - Directory Specifier - Directory Speci	Make all global symbols static (make_static, Produce listing of input and output sections in <file -m)<="" nap_file,="" td=""><td>"\$(Pro me).map" Browse</td></file>	"\$(Pro me).map" Browse
File Type Specifier General Options Library Function Assumptions Optimizations Parser Diagnostics Options Parser Preprocessing Options	Disable type merging in symbolic debugging inform Strip symbol table and line number entries (no_s) specify output file name (output_file, -o) Search libraries in priority order (priority, -priority) Y Produce a relocatable output module (relocatable, -r)	r, -b) "new.out"
- Raiser Pieprocessing Options - Runtime Model Options Symbolic Debug Options - School Linker General Options	Add <dir> to libraries; resolve backward references (reread_libs, -x) Add <dir> to library search path (search_path, -i) '\$(CG_TOOL_ROOT)/lib" '\$(CG_TOOL_ROOT)/lib"</dir></dir>	 記録 記録 記録
	Set C system stack size (stack_size, -stack) Generate far call trampolines (trampolines)	
	Add <sym> to symbol table as an unresolved symbol (undef_sym, -u) c_int01 Warn if an un_fied output section is created (warn_sections, -w)</sym>	원 원 영 산 산
	Produce detailed link, for data-base in <frile> (xml_link_info, -xml_lin</frile>	
ary search	Non-standard	OK Cancel
paths	entry-point (set in ccr.cmd)	

3.4 Final build steps

After compilation a batch file is executed:

```
rem Remove debug info
strip6x %1.out
rem create .msf file
copy %1.out exec.out
%2\vctools\util\econv32 %1
%2\vctools\util\scvt32
rem copy .out and .msf file to send folder
copy adsp.msf %3\send\%1.msf
copy %1.out %3\send\%1.out
del adsp.*
```

The first line: **strip6x new.out** removes debugging information from the executable code and makes the file smaller.

The next lines convert the executable *.out" file into an *.msf file for serial and Telnet upload.

Both executable files - *.msf and *.out files are copied to the send folder.

All redundant files are deleted from the project directory.

🕸 Properties for vo	proje	ect (Filtered)	
type filter text		C/C++ Build 🔶 🗧	> -
C/C++ Build CCS Build		Active configuration Project Type: C6000 Configuration: Release Configuration Settings Tool Settings Build Steps Error Parsers Binary Parser Environment Macros	
Calls a batch file to create msf file and copy files to the send folder		Pre-build step: Command: Description: Command: \${CCE_INSTALL_ROOT}/vctools/misc/VCFinalSteps.bat \${BuildArtifactFileBaseName} \${CCE_INSTALL_ROOT} \${WorkspaceDirPath} Description: Apply Predefined Step: Restore Defaults Apply	
0		OK Cancel	

3.5 Compiling other source files

To create a new source file:

right-click on the project, and choose New → Source File. Name it and confirm. The new source file appears in the project tree.

To compile another existing source file:

- right-click on the source file (in the first example hello.c) and choose "Delete"
- then right-click on the project, choose "Add Files..." and select your new source file. CCS will copy it automatically to your project folder.

3.6 Creating new projects

To create new projects without losing the compiling options for VC cameras, simply copy the original project **vcproject**:

- right-click on the project and choose "Copy"
- right-click on the blank space in the left column and choose "Paste"
- in the dialog box, give your new project a name, and confirm with OK

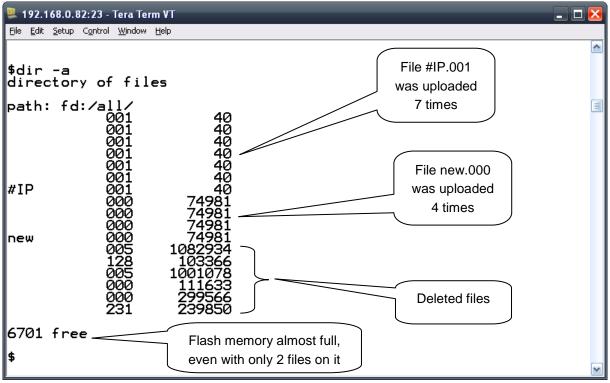
the new project is created and is available in the "Project Explorer" column.

4 The camera file system(s)

- All VC Smart Cameras feature a flash EPROM as non volatile program and data storage media (4 to 32 MB). VC4XXX cameras with video output also incorporate a 2 GB SD card as extended data storage
- 2. The following overview highlights the file handling differences between flash and MMC / SD:

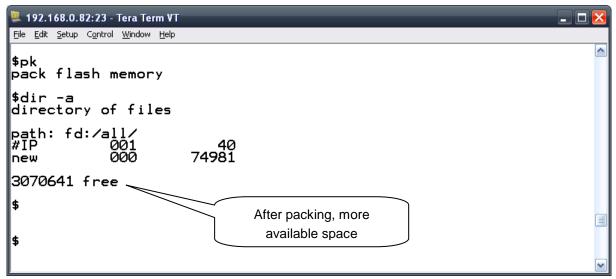
Fla	ash EPROM	MMC / SD		
	Does not support standard file extensions! The following files types are supported and automatically converted into numerical file extensions (FTP transfer): exe $\rightarrow 000$ asc $\rightarrow 001$ (also: asc, htm, html, txt from VCRT 5.25) dat $\rightarrow 002$ jpg $\rightarrow 003$ binary $\rightarrow 231$ This extension is also displayed if one of the file types above is not recognized (adjust file extensions on PC in this case).	-	Does support standard file extensions	
-	EPROM required packing in order to free memory after file deletion.	-	MMC and SD are self organizing, i.e. packing after deletion not required.	
-	it is not possible to create subdirectories	-	Creation of subdirectories possible \$mkdir md:/subdir	
-	Faster access	-	Slower access	
-	Protected first flash EPROM sector: fd:/sys/ Accessible with "\$dir -x"	-	No subdirectories	
-	Working directory: fd:/user	-	Path: md:/	
-	File upload per Telnet/ RS232 /FTP possible	-	File upload only per FTP possible	
-	Only *.msf file upload	-	Upload of standard file types (no *.msf)	
-	Default directory for program execution	-	Executing programs from MMC possible after calling : \$cx md: (back: \$cx fd:)	

3. When deleting a file from the flash EPROM using the command "del", the file is not physically erased. It is also the case when uploading several times a file with the same name to the camera: the file will not be overwritten but will use more space. The deleted files are visible when using the shell command "**\$dir -a**".



Example: shell command "dir –a"

4. This means that the flash EPROM sometimes gets full. To release the space occupied by these "ghost" files, packing is required, with the shell command "**\$pk**" (can last up to a few minutes).



Shell command "dir -a" after packing



In summer 2013 VC cameras will get a new flash file system which does not require packing anymore. Check the support news.

5 Setting the camera IP address: the #IP file

- 1. The camera IP address is changed by uploading a #IP file into the camera memory. This is an ASCII file containing the IP address settings.
- 2. The default IP address of all Vision Components Smart Cameras is 192.168.0.65
- 3. In order to operate more than one camera on a network, each camera requires an individual IP address. Changing the IP address of a camera is done the following way:
 - Create a text file named "#IP.txt"
 - Edit the file and type in the desired IP address (**RETURN at the end of every line required!**). For example:

#IP file entry:	Explanation
IP: 192.168.0.81,J	New camera IP address – change at next start up
MSK: 255.255.0.0,J	Mask for setting the IP address subgroup
GTW: 192.168.0.1,J	Specify gateway if required
DHCP₊J	Adding "DHCP" to the "#IP"- file requests the IP address allocation from the DHCP server. In case DHCP allocation is not possible, the camera is set to the IP address specified in the first line. If no other IP address is specified in this file, the camera is set to its default IP address: 192.168.0.65
PWD: mypassword,J	It is possible to protect the access to the camera with a password. The password set in the #IP file will be asked for both Telnet and FTP connections to the camera (for FTP: username is don't care)
NS1: 192.168.0.1₊ NS2: 192.168.0.2₊J	NS1 and NS2 are the IP addresses of DNS servers. When these (or at least one) are available in the #IP file, VCRT automatically starts the DNS resolver at startup and allows to use the name resolving functions.

- Upload the file to the camera (important: to fd:) using FTP.
- 4. The new IP address is displayed on the monitor connected to the camera for a few seconds at every power up. The file is displayed as "#IP.001" in the camera memory (flash EPROM). Deleting this file resets the camera to its standard IP address of 192.168.0.65 at next start up.

You can check the #IP file at the camera shell with the command: \$type #IP It is advised to perform this #IP file check prior to re- booting the camera!

6 Starting your application automatically: the autoexec file

These are the steps for generating an autoexec file:



 Create a text file called "autoexec.txt" – Make sure that a Return (CR + LF) is inserted at the end of each line. The command in that line will not be executed otherwise! This is often the reason why programs are not executed.

2. Type in the commands and don't forget the RETURN after every command

for example:

sh 10000	/*sets the shutter speed to 10ms*/
img2b &	/*starts a background program with lower priority
myprog	/*starts the program "myprog" previously uploaded into the camera $\ensuremath{EPROM^*}\xspace$ /

3. Upload the autoexec.txt file to the camera (**important: to fd:**) using FTP.

The camera now starts the commands inside the autoexec file after every power up.

You can check the content of your autoexec file at the camera shell with the command: **\$type** autoexec.

7 IP address forgotten, autoexec running: recovering the camera

The VCnet Recovery Tool is provided for

- resetting the IP address of the VC cameras
- preventing the execution of the autoexec file.

In order to use the VCnet Recovery tool, follow the steps below:

- 1. Download and install Java on your PC.
- Download VCnet Recovery Tool from www.vision-components.com or look in your install folder under vctools\util
- 3. If downloaded, unpack the "vcnet14.zip" folder a directory on your harddrive (for instance C:\ti\Util...).
- 4. Open the Dos command line window and change to the directory containing "vcnet.jar".
- Execute the following command from the DOS Window "vcnet.bat 5912345", by specifying the camera serial number as shown. This command sends vcp packets via UDP broadcast for the next 15 seconds.
 Sending this command resets the corresponding camera to the default IP address and bypasses Autoexec execution.
- 6. Boot the corresponding camera (power on) during the next 15 seconds. During start up the camera listens 0.5 seconds for vcp packets send with vcnet.jar.
- 7. If a valid vcp packet is received from camera an answer packet is sent (see example below). The camera continues booting in standard configuration:

Default IP address:	192.168.0.65
Mask:	255.255.255.0
Gateway:	none

Note:

→ An autoexec file residing in flash memory is not executed when VCnet is called!



- → The IP reset and auto exec bypass is only temporary! In order to change the IP address or autoexec, the corresponding file needs to be changed.
- \rightarrow The timeout for receiving packets is set to 15 seconds after start of VCnet.
- → Since UDP is not a "fail safe" protocol, execution of VCNet may not work at the first time. Repeat calling VCNet if necessary.

A full description of the VCnet tool can be found in the corresponding ReadMe File.

8 Communication troubleshooting

- 1. Connect the Camera directly to the PC using the cross link cable and adapter as shown in the installation document (or connect via Hub to the PC).
- Make sure your PC network connection is set to the same subnet as the camera (i.e. 192.168.0.XXX, mask: 255.255.255.0 refer to chapter 4 of part I).
- 3. Turn off "automatic allocation of IP address" as described in chapter 4 of part I.
- 4. Turn off any fire wall on your PC.
- check with "arp –a" at the DOS input window (under accessories) if there are any entries for the camera's IP you are using e.g. 192.168.0.65. If so, delete that arp entry at the DOS prompt with the following command: "arp –d 192.168.0.65" (calling arp –d without parameter deletes all arp entries). This step is not required after VCRT 5.26 camera OS!
- 6. Re check with "arp-a" if the arp entry for that IP address has been deleted successfully.
- 7. Check if the IP address is already in use in your network (for instance with "ping 192.168.0.65"). (in that case you get a message "goodbye" and the connection shuts down). If so, disconnect your PC from your network and connect straight to the camera using the cross link cable and change the camera IP address as shown in **chapter 5** of part II.

From VCRT 5.26 it is possible to take over an existing Telnet session.

- Re- start the camera (power up). Confirm that the camera IP address is still the default address (192.168.0.65) – check at startup the video output of camera. Wait until a live image is displayed on the VGA output.
- Install and start TeraTerm (with Administrator rights on your PC), Refer to chapter 5 of part I. Adjust TCP/IP settings as shown.
- 10. if the welcome prompt is not displayed, please shut down TeraTerm, reboot the camera and try again to re- establish a connection.(Usually the connection works at the very first attempt, but sometimes a camera re- boot may be required).
- 11. Try to connect to the camera using the VCNet tool (see chapter 10.5.1.2).
- 12. if still no connection can be achieved, check all cables (swap with another set of cables if possible). Check correct pin allocation for self made connections.

Smart Cameras made in Germany



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