

# **Grayhill 3Dxx Display Products**

Setup and Usage of Qt 5.9.3 Development Software – Windows

**Revision** C



# **Revision History**

Revision	Date	Description
^		This release intentionally skipped to provide
A		consistent revisions with releases
D		This release intentionally skipped to provide
В		consistent revisions with releases
		Initial release for Windows
рС	02/27/2018	Updated glibc support to include gconv_UTF and
		ZH
		Document clean-up and process improvements
С	04/06/2018	Updated Grayhill examples to be runnable upon
		loading
		Updated gcclibs_4.8.3



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#### Introduction

This document describes:

- Setup and usage of the Qt-based development environment for Grayhill 3Dxx display products
- Code development for a 3Dxx Display product in the Qt IDE
- Accessing various 3Dxx hardware features via this code
- Loading developed application code onto a 3Dxx Display product

This Qt cross-platform development environment runs under Windows 7 and Windows 10.

The different features of the Grayhill displays are described below as are differences in their installation.

This document is intended for use by software developers who are familiar with programming in C/C++ using the Qt framework. Experience developing applications for Linux platforms is a definite plus.

Screen shots were designed to be as accurate as possible and should be used for reference.

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#### **Supported Hardware Products**

The Qt-based development environment is supported on the following Grayhill 3Dxx Color Display Models:

- 3D50
- 3D70
- 3D2104

The table below summarizes the key features of each of these models. Note that the features of a specific product may vary depending on the purchased hardware configuration.

Model Number	3D50	3D70	3D2104
Display Size (inches)	5	7	10.4
Pixel Count (w x h)	800 x 480	800 x 480	1024 x 768
Touch Screen Input	Yes	Yes	Yes
Real Time Clock	Yes	Yes	Yes
CAN Ports	2	2	3
Camera Inputs	2	3	4
LISP ports	1 (maintenance	1 (maintenance	1 (maintenance
USB ports	only)	only)	only)
<b>P</b> \$232	1 (maintenance	1 (maintenance	1 (maintenance
K5232	only)	only)	only)
Built-in Ethernet	0	1	1
Digital Input (dedicated)	1	4	0
Digital Output	1	1	0
(dedicated)	1	4	
Digital Input / Output	3	0	4
Analog Input	0	2	0
Audio Output	No	1 channel	No
Buzzer	No	Yes	Yes

#### **Recommended Equipment from Grayhill**

If using Model 3D50 5 Inch Display: 3D50DEV-100 3D50 Development Kit

If using Model 3D70 7 Inch Display: 3D70DEV-100 3D70 Development Kit

If using Model 3D2104 10.4 Inch Display: 3D2104DEV-100 3D2104 Development Kit



#### **Other Recommended Equipment**

- An Ethernet port connected to a DHCP server that can be connected to the 3Dxx Display. This port should be on the same network as the development PC.
- PC Running Windows 7/10 with the following minimum configuration:
  - ➤ 4 GB RAM
  - > 10 GB available hard drive space on C:
  - Ethernet port
  - RS232 Port (or USB to serial adapter)
  - Internet Access

#### **Software Required**

The following files are available for download from Grayhill at: http://www.grayhill.com/qt43d

- QtInstaller
  - > Qt Windows online installer
- QtGhSupport
  - Files for building Qt applications
  - Support utilities for building Qt applications
  - Example projects from Grayhill
- 3Dxx\_Qt\_Usage\_Guide\_Windows.pdf (this document)



#### **Installation Overview**

This is a brief overview of the installation steps for the Qt-based development environment for a Grayhill 3Dxx Display.

- First connect the 3Dxx Development Kit hardware to the PC being used. This includes connecting the serial port and Ethernet port interfaces. For the 3D50 Display this procedure is described in detail in the document "3D50DEV Quick Start Guide.pdf" and for the model 3D70 Display it is described in the document "3D70DEV Quick Start Guide.pdf".
- Qt Creator for Windows is downloaded and installed on the development PC
- Additional third party utilities are downloaded, installed, and configured
- Grayhill support files are downloaded and installed
- The serial and Ethernet links to the target 3Dxx Display hardware are established.
- Configuration scripts are run on the target 3Dxx display board and Windows to configure the 3Dxx display to operate with Qt instead of VUI Builder<sup>©</sup>. The display scripts will need to be run on each 3Dxx Display product that will be operated with Qt.
- Finally instructions are provided on how to open and run a Qt demonstration project on the 3Dxx Display target hardware. This demonstration project illustrates:

using touch screen "buttons" using touch screen swipes setting the 3Dxx backlight operating the 3Dxx camera input accessing and setting the real time clock

For the 3D70 Display there are also samples of using the audio output, the analog input, and the internal buzzer.

Instructions for using the desktop simulator are in Appendix D: Build and Run 3Dxx Desktop Application.



#### **Download and Install Qt Creator**

In this section, the Qt on-line installer will be downloaded from Grayhill and executed to download all the necessary files from Qt. Once all the files are downloaded; Qt will be installed on the development PC.

- Using your favorite web browser, download "Qt Creator Windows Installer" from the Grayhill website
- Open the downloads folder and double click on the file to execute the installer

Open File - Security Warning				
Do you	Do you want to run this file?			
	Name: <u>C:\Qt\qt-unified-windows-x86-3.0.2-online.exe</u>			
	Publisher: The Qt Company Oy			
	Type: Application			
	From: C:\Qt\qt-unified-windows-x86-3.0.2-online.exe			
	<u>R</u> un Cancel			
<b>⊘</b> Al <u>w</u> a	☑ Al <u>w</u> ays ask before opening this file			
•	While files from the Internet can be useful, this file type can potentially harm your computer. Only run software from publishers you trust. What's the risk?			

• Click "Run"

-	
to an	X
Qt Setup	
Welcome to the Ot online installer	
welcome to the Qt online installer	
This installer provides you with the option to download e version of Qt.	either an open source or commercial
Commercial users: Please log in with your Qt Accoun	t credentials.
Open source users: You have the option to log in usir your Qt Forum login). If you do not have a login yet, yo next step.	ng your Qt Account credentials (e.g. u have the option to create one in the
<u>Ot Account - Get access to a variety of services</u>	
LGPL compliance & obligations	
Choosing the right license for your project	
Settings	Next Cancel

Grayhill

• Click Next

Qt Setup         Qt Account – Your unified login to everything Qt         Please log in to Qt Account         Login         Email         Password         Forgot password?         Sign-up         Valid email address         Password         Confirm Password         I accept the service terms.		An ISO-9001 Compan
Qt Setup         Qt Account – Your unified login to everything Qt         Please log in to Qt Account         Login         Email         Password         Eorgot password?         Need a Qt Account?         Sign-up         Valid email address         Password         Confirm Password         I accept the service terms.	_	
Qt Setup         Qt Account – Your unified login to everything Qt         Please log in to Qt Account         Login         Email         Password         Forgot password?         Sign-up         Valid email address         Password         Confirm Password         I accept the service terms.		
Qt Account – Your unified login to everything Qt     Please log in to Qt Account   Login   Email   Password   Forgot password?     Need a Qt Account?   Sign-up   Valid email address   Password   Confirm Password   I accept the service terms.	Qt	Setup
Qt Account – Your unified login to everything Qt   Please log in to Qt Account   Login   Email   Password   Eorgot password?     Need a Qt Account?   Sign-up   Valid email address   Password   Confirm Password   I accept the service terms.		
Please log in to Qt Account         Login         Password         Eorgot password?         Sign-up         Valid email address         Password         Confirm Password         I accept the service terms.	t Acco	ount – Your unified login to everything Qt
Login Email   Password   Eorgot password?     Need a Qt Account?   Sign-up   Valid email address   Password   Confirm Password   I accept the service terms.	D	and les in to Ot Account
Login Enlai   Password   Forqot password?     Need a Qt Account?   Sign-up   Valid email address   Password   Confirm Password   Image: Interpret the service terms.	PI	ease log in to Qt Account
Password Forgot password? Need a Qt Account? Sign-up Valid email address Password Confirm Password I accept the service terms.	.ogin E	
Need a Qt Account?   Sign-up   Valid email address   Password   Confirm Password   I accept the service terms.	P	assword
Need a Qt Account?   Sign-up   Valid email address   Password   Confirm Password   I accept the service terms.	E	orgot password?
Sign-up Valid email address   Password   Confirm Password      I accept the service terms.		
Sign-up       Valid email address         Password       Confirm Password         I accept the service terms.		Need a Qt Account?
Password Confirm Password I accept the <u>service terms</u> .	Sign-up	Valid email address
Confirm Password  I accept the <u>service terms</u> .		Password
I accept the <u>service terms</u> .		Confirm Password
		I accept the <u>service terms</u> .

Grayhill

• Create an account, if desired – otherwise click "Skip"

	Grayhill An ISO-9001 Company
C Qt	Setup
Qt Acco	ount – Your unified login to everything Qt
Pl Login E	ease log in to Qt Account
E	assword proof password?
	Need a Qt Account?
Sign-up	John.Employee@company.com
	••••••
	I accept the <u>service terms</u> .
Settings	Next Cancel
L	

• If an account was created click "Next" – otherwise this screen will not appear



• Whether "Skip" or an account was created; installation continues here

G Qt Setup	x
Setup - Qt	
Welcome to open source Qt setup.	
Settings	Next Quit

• Click "Next"



Settings

Next

Quit



Kau

• Click "Next"

Note: Due to the nature of Qt and the way it stores configuration information; Qt must be installed in C:\Qt.

	Grayhill An ISO-9001 Company
Qt Setup	X
Select Components Please select the components you want to install.	
<ul> <li>Preview</li> <li>Qt 5.10.1 snapshot</li> <li>Qt 5.11.0 Alpha snapshot</li> <li>Qt Creator 4.6.0-beta1</li> <li>Qt Creator 4.6.0-beta1 CDB Debugger Su</li> <li>Qt</li> </ul>	Latest Qt and related package preview snapshots
III            ✓         III           Default         Select All	
	Next Cancel

• Minimize Preview (do not select anything)



- Expand Qt  $\rightarrow$  Qt 5.9.3
- Select "MinGW 5.3.0 32bit"

Ot Setup		×
Quotecop		
Select Components		
Please select the components you want to install.		
	Latest Qt and related package previ	iew
∠ Qt	snapshots	
▷ Qt 5.10.0 ▷ Qt 5.9.4		
▲ ■ Qt 5.9.3		
MinGW 5.3.0 32 bit		
UWP x64 (MSVC2015)		
UWP x86 (MSVC2015)		
UWP armv7 (MSVC2017)		
UWP x86 (MSVC2017)		
msvc2013 64-bit		
msvc2015 32-bit		
msvc2013 64-bit		
Android x86		
Android ARMv7		
Qt Charts		
Qt Data Visualization		
Qt Purchasing		
Qt WebEngine		
Qt Network Auth (TP)		
Qt Remote Objects (TP)		
Qt Script (Deprecated)		
▷ □ Qt 5.9.2		
▷ □ Qt 5.9.1 ▷ □ Ot 5.9.0		
▷ □ Qt 5.8		
▷ □ Qt 5.7		
▷ Qt 5.6.3 ▷ □ Qt 5.6		
▷ □ Qt 5.5		
▷ □ Qt 5.4		
▷ Qt 5.3 ▷ □ Qt 5.3		
▷ □ Qt 5.2.0		
▷ □ Qt 5.1.1		
P □ QC 5.1.0 D Ot 5.0.2		
Tools		
Default Select All Deselect All		
	Next Can	cel



- Minimize Qt 5.9.3
- Expand Tools (Use the pre-selected default)

G Qt Setup	
Qt SetupSelect ComponentsPlease select the components you want to install. $Preview$ $\blacksquare$ Qt $\square$	Latest Qt and related package preview snapshots
<ul> <li>Qt 5.4</li> <li>Qt 5.3</li> <li>Qt 5.2.1</li> <li>Qt 5.2.0</li> <li>Qt 5.1.1</li> <li>Qt 5.1.0</li> <li>Ot 5.0.2</li> <li>Tools</li> <li>Qt Creator 4.5.0 CDB Debugger Support</li> <li>Qt 3D Studio 1.0.0</li> <li>MinGW 4.9.2</li> <li>MinGW 4.9.1</li> <li>MinGW 4.8.2</li> <li>MinGW 5.3.0</li> <li>MinGW 4.8</li> <li>Qt Installer Framework 2.0</li> <li>Qt Installer Framework 3.0</li> </ul>	
	<u>N</u> ext Cancel

• Click Next

5	ement
Please read the fol	lowing license agreements. You must accept the terms contained in these agreements vith the installation.
Qt Installer LGPI PYTHON SOFTV	License Agreement VARE FOUNDATION LICENSE VERSION 2
GENERAL	
Qt is available und of needs. Comme on your end prodi additional functior relationship with 1	ler a commercial license with various pricing models and packages that meet a variety cial Qt license keeps your code proprietary where only you can control and monetize uct's development, user experience and distribution. You also get great perks like vality, productivity enhancing tools, world-class support and a close strategic the Qt Company to make sure your product and development goals are met.
Qt has been creat developers. To su of the functionalit components are a development and open source licens that you comply v	ed under the belief of open development and providing freedom and choice to pport that, The Qt Company also licenses Qt under open source licenses, where most y is available under LGPLv3. It should be noted that the tools as well as some add-on vailable only under GPLv3. In order to preserve the true meaning of open uphold the spirit of free software, it is imperative that the rules and regulations of ses are followed. If you use Qt under open-source licenses, you need to make sure vith all the licenses of the components you use.
Qt also contains s Please refer to th	ome 3rd party components that are available under different open-source licenses. e documentation for more details on 3rd party licenses used in Qt.
GPLv3 and LGPLv3	3
GNU LESS	R GENERAL PUBLIC LICENSE
The Qt Toolkit is (	Copyright (C) 2017 The Qt Company Ltd.
You may use, dis GNU Lesser Gene Public License Ver	tribute and copy the Qt GUI Toolkit under the terms of ral Public License version 3, which supplements GNU General sion 3. Both of the licenses are displayed below.
I h <u>a</u> ve read an	d agree to the terms contained in the license agreements.

Trayhi

• Click "Next"

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•

	An 150-9001 Company
Qt Setup	
Start Menu shortcuts	
Select the Start Menu in which y create a new directory.	ou would like to create the program's shortcuts. You can also enter a name
Qt	
Accessories Administrative Tools JIRA	
Linaro GCC 4.8-2013.12 Maintenance	
MinGw Python 3.6	
Qt Ruby 2.5.0-1-x64	
Startup TaskReporting	
Windows Virtual PC	
	<u>N</u> ext Cancel

Grayhill

• Click "Next"





• Click "Install"







- Unselect "Launch Qt Creator"
- N.B. Qt Creator does **not** know the IP address of the target board at this time; the target board's IP address will be discovered and configured later. Any time the IP address of the display changes, Qt Creator must be re-launched if using the /etc/hosts file for IP address resolution.
- Click "Finish"



### **Download and Install Support Files**

This section details the downloading and installation of necessary support files.

## PuTTY

The examples shown in this document reflect the use of PuTTY. Feel free to substitute a different client.

• Navigate to https://www.chiark.greenend.org.uk/~sgtatham/putty/latest.html and download the appropriate version



- Open the downloads folder and double click to execute the PuTTY installer
- Follow the installation instructions connection configuration is described later on in the document



#### WinSCP

The examples shown in this document reflect the use of WinSCP. Feel free to substitute a different utility.

• Navigate to https://winscp.net/eng/download.php and click "DOWNLOAD WINSCP..."



- Open the downloads folder and double click to execute the WinSCP installer
- Follow the installation instructions
- When installation is complete; select "Launch WinSCP" -- configuration is described later in the document after the IP address is discovered



## **Grayhill Qt Support Files**

This section downloads and installs the necessary Qt support files. It also configures Qt Creator for the 3Dxx Display kit.

- Download "Qt Creator Windows Support Files" from the Grayhill website
- Open the download folder and double click on "QtGhSupport.exe"

A User Access Control window may pop-up

- Click "Yes" to allow the self-extracting zip file to proceed
- The following window appears



• Click "Yes"







• Using Windows Explorer; navigate to "C: QtGhSupport" and verify the folder was installed

📙   🛃 =   QtGhSupport							-	×
File Home Share View								~ 🕐
Image: A constraint of the con	opy o ×	New item • New folder	Properties	Select all				
Clipboard	Organize	New	Open	Select				
← → ∽ ↑ 📙 → This PC → OS (C:) → QtGhSupp	ort					~ ē	Search QtGhSupport	P
	Name	^	Date modified	Туре	Size			
> 📌 Quick access	debugger		3/19/2018 8:39 AM	File folder				
> 🗥 OneDrive	gcc-linaro-2013		3/19/2018 8:39 AM	File folder				
> This PC	GrayhillExample	s	3/19/2018 8:39 AM	File folder				
	Perl64		3/19/2018 8:39 AM	File folder				
> 💣 Network	Python27		3/19/2018 8:39 AM	File folder				
	qmakeInstall		3/19/2018 8:40 AM	File folder			Select a file to preview.	
	targetRootFiles		3/19/2018 8:40 AM	File folder				
	targetSysroot		3/19/2018 8:40 AM	File folder				
	addKit.bat		3/16/2018 3:20 PM	Windows Batch File	4 KB			
9 items								



### **Configuring 3Dxx Display's IP Address**

In order to complete the setup of the Qt development environment for the 3Dxx Display hardware; the IP address assigned to the 3Dxx Display must be determined.

In order to perform these tasks, it is necessary to connect the 3Dxx Display to the same network as the development PC.

- Connect the 3Dxx Display serial port to a serial port on the development PC
- Determine the serial port device name to use for PuTTY (serial communication between the PC and the target). Usually, COM1 is used. (reference Device Manager → Ports if not certain)
- Launch PuTTY
- The PuTTY Configuration screen appears configure as follows:

Select the "Serial" button Set "Serial line" to appropriate COM Port Change the "Speed" to 115000 Enter a name in "Saved Sessions" (e.g. comPort1) Click "Save"

N.B. If "Open" is clicked any unsaved configuration modifications are lost!

Category:       Basic options for your PuTTY session         Specify the destination you want to connect to         Serial line       Speed         Keyboard       COM1         Features       COM1         Window       Raw         Appearance       Rlogin         Behaviour       Save or delete a stored session         Saved Sessions       ComPort 1         Default Settings       Load         Proxy       Telnet         Rlogin       Serial         Serial       ComPort 1         Default Settings       Load         SerialCom1       Usb SerialCom4         ComPort 1       Delete	😵 PuTTY Configuration	? ×
Image: Serial Com 1     Serial Com 1     Save       Image: Serial Com 4     Image: Save     Image: Save       Image: Save     Image: Save     Image: Save       Image: Save     Image: Save     Image: Save       Image: Save     Image: Save     Image: Save	PuTTY Configuration Category: 	Basic options for your PuTTY session Specify the destination you want to connect to Serial line COM1 Connection type: Raw Ielnet Rlogin Soved Session Saved Sessions ComPort1 Default Settings IP Address Load
Always Never  Only on clean exit  About Help  Open  Cancel	Colours □ · · Connection □ · · Data □ · · Proxy □ · · Telnet □ · · SSH · · · Serial About Help	Load         IP Address         SerialCom1         Usb SerialCom4         comPort1         Delete         Close window on exit:         Always       Never         Open       Cancel



- Click on "Data"
- Set "Auto-login username" to "root"

😵 PuTTY Configuration		2 ×
Vurtry Configuration Category: Categ	Data to ser Login details Auto-login usemame When usemame is not spe Prompt Use system Terminal details <u>T</u> erminal details <u>T</u> erminal speeds Environment variables <u>V</u> ariable Value	vector       root       ccfied:       em usemame (admin)       xterm       38400,38400       Add       Remove
About <u>H</u> elp		Open <u>C</u> ancel



• Click back on "Session", then click "Save" again

😵 PuTTY Configuration		? ×
Putty Configuration         Category:         □ Session         □ Logging         □ Vertical         □ Peata         □ Proxy         □ Telnet         □ Rlogin         □ SSH         □ Serial	Basic options for your PuTT Specify the destination you want to co Serial line COM1 Connection type: Raw <u>T</u> elnet Rlogin C Load, save or delete a stored session Saved Sessions comPort1 Default Settings IP Address SerialCom1 Usb SerialCom4 comPort1 Close window on exit: Always Never O Only of	Y session nnect to Speed 115000 SSH  Serial Load Save Delete on clean exit
About <u>H</u> elp	<u>O</u> pen	<u>C</u> ancel

• Lastly, click "Open" to establish a connection



• Make sure that the 3Dxx Display is powered up and press the "Enter" key.



- A "ghiimx6 login:" prompt should appear. If the 3Dxx Display was just powered up; startup messages may appear as well, but when they are done, pressing the "Enter" key should produce a "ghiimx6 login:" prompt as shown.
- At the "ghiimx6 login:" prompt enter "root" (no password is required).
- Depending on the IP address type, refer to the appropriate appendix:
  - o Dynamic Appendix J: Dynamic IP Address
  - Static Appendix K: Static IP Address



- Open Windows Explorer window (<Window>-e)
- Navigate to C:  $\rightarrow$  Windows  $\rightarrow$  System32  $\rightarrow$  drivers  $\rightarrow$  etc and select "hosts"

	600				
Computer > OS	S (C:) ► Windows ► System32	? ► drivers ► etc	✓ Search	h etc	٩
<u>F</u> ile <u>E</u> dit <u>V</u> iew <u>T</u> ools <u>H</u> elp					
Organize 🔻 📄 Open 👻	Burn New folder			•== •	
Resources	Name	Date modified	Туре	Size	
SchCache	hosts	2/7/2018 2:47 PM	File	1 KB	
schemas	Imhosts.sam	6/10/2009 4:00 PM	SAM File	4 KB	
ServiceDrofiles	networks	6/10/2009 4:00 PM	File	1 KB	
servicing	protocol	6/10/2009 4:00 PM	File	2 KB	
Setup	services	6/10/2009 4:00 PM	File	18 KB	
ShellNew					
SoftwareDistribution					
Speech					
j symbols					
) system					No preview
퉬 System32					avallable.
\mu drivers :	=				
🍑 ar-SA					
🔒 cs-CZ					
퉬 da-DK					
🕌 de-DE					
📕 el-GR					
📕 en-US					
es-ES					
etc 📗					
ti-H	▼			-	
1 item selected				j Computer	iii.



- Right click to edit the file using your favorite flavor of editor (Screenshot illustrates Notepad++)
- After the editor is launched, Windows Explorer can be closed
- Add the IP address and "gmd" as illustrated below:

C:\Win	dows\System32\drivers\etc\hosts - Notepad++ [Administrator]
<u>F</u> ile <u>E</u> di	t <u>S</u> earch <u>V</u> iew E <u>n</u> coding <u>L</u> anguage Se <u>t</u> tings T <u>o</u> ols <u>M</u> acro <u>R</u> un <u>P</u> lugins <u>W</u> indow <u>?</u> X
	= 🖻 🔓 🕞 🚖   🕹 🐚 💼   Ə 😋   🏙 🍇   🍕 😪   🖫 🔤 = 1 🎼 🖉 🔊   ڪ 🥥   🗉 🗈 座 👋
😑 hosts 🛙	🕽 🔚 config3Dxx-Qt-5.6.2.sh 🔀 🔚 3Dxx-Qt-5.6.2-qmake.conf 🔀 🔚 README.bt 🗷 🔚 QtLibrarySetup3Dxx-5.9.1 🔀 🔚 config.sh 🗷 📳
1	Copyright (c) 1993-2009 Microsoft Corp.
2	
3	This is a sample HOSTS file used by Microsoft TCP/IP for Windows.
4	This file contains the mannings of TD addresses to host names. Fach
6	entry should be kept on an individual line. The IP address should
7	be placed in the first column followed by the corresponding host name.
8	The IP address and the host name should be separated by at least one
9	space.
10	÷
11	Additionally, comments (such as these) may be inserted on individual
12	f lines or following the machine name denoted by a '#' symbol.
13	
14	For example:
16	t 102 54 94 97 rhino acme com t source server
17	\$ 38.25.63.10 x.acme.com \$ x client host
18	
19	Localhost name resolution is handled within DNS itself.
20	127.0.0.1 localhost
21	t ::1 localhoat
22	192.168.40.118 gmd
<u> </u>	
Norr leng	th : 842 lines : 22 Ln : 22 Col : 15 Sel : 0   0 Windows (CR LF) UTF-8 INS

• Save the file

N.B. The editor may ask to restart in admin mode; allow it to continue as *hosts* is a system file

#### N.B. If the IP address of the display changes; hosts must be updated and Qt Creator re-launched



#### **Transfer Configuration Files to Display**

- Return to the WinSCP window and establish a login session and connection
- Select "New Site" and configure as follows:
  - File protocol SCP
  - Host name gmd or <IP address>
  - User name root

🌆 Login		- 🗆 X
New Site	Session File protocol: SCP Host name: gmd User name: root Save	Port number: 22 - assword: Advanced
<u>T</u> ools ▼ <u>M</u> anage ▼	🔁 Login 🛛 🔻	Close Help

• Click Save and enter a name

Save session as site	?	×
<u>S</u> ite name:		
Grayhill Display		
<u>F</u> older:		
<none></none>		$\sim$
Save password (not recommended)		
<u>C</u> reate desktop shortcut		
OK Cancel	H	elp

• Click "OK"



🌆 Login		– 🗆 X
Vew Site	Session File protocol: SCP Host name: gmd User name: root Edit	Po <u>r</u> t number: 22 A <u>d</u> vanced
	Login V Close	e Help

- Select "Grayhill Display"
- Click "Login"
- If this is the first connection to this IP address, the following will pop-up



- Click "Yes"
- In the left pane Navigate to C:\QtGhSupport\targetRootFiles Hint: Clicking on the "C" goes directly to that directory level



• The right pane defaults to /home on the display; the display may already have files

🌆 targetRootFiles - gmd -	WinSCP						-		×
Local Mark Files Comm	ands <u>S</u> essio	n <u>O</u> ptions <u>R</u> emote	<u>H</u> elp						
🖶 💦 🔁 Synchronize	<b>-</b> 🖉 💽	👔 🎲 Queue	Transfer Settings Default	- 👩 -					
📮 gmd 📑 New Session	1								
L C: OS	- 🔗 🔽 🕔	🔶> - 🗈 🕞	n 2 %	home 🗸 🚭 [	7	→ · · · · · · · · · · · · · · · · · · ·	Find Files	2	
C:\OtGbSupport\targetBoot				/home/					
News	Cine Cine	Tures	Channed	Neme	Cine	Channed	Distant	0	^
	5126	Type	Changed	Name	5126	Changed	Rights	Owner	
		Parent directory	3/13/2018 8:21:59 AM	<b>1</b>		9/22/2017 4:06 PM	rwxr-xr-x	root	
tonts		File folder	3/13/2018 8:21:59 AM	demo/in		12/22/2017 10:57 AM	rwxr-sr-x	root	
startup		File folder	3/13/2018 8:21:39 AM	demo Iuin		1/15/2018 1:52 PM	rwxrwxr-x	1000	
2Dec profile	1 // D	File Tolder	4/2/2017 4/02/00 DM	demotion_ong		1/12/2010 2:12 PIVI	TWXT-ST-X	root	
Dox_profile local	2 1 1 1		2/32/2017 4:02:00 PW	samegame		12/19/2017 3:14 PM	TWXT-ST-X	root	
	1 KB	File	4/3/2017 3:47:40 PM	stdos		2/23/2018 1-51 DM	DAXE	root	
blankfh1	1 KB	File	4/3/2017 3:47:54 PM	3Dvx profile	1 KB	4/3/2017	DW-FF	root	
	1 KB	File	4/3/2017 3:48:00 PM	3Dxx profile.local	3 KB	2/23/2018 2:07 PM	rw-rr	root	
gcclibs 4.8.3 armel.ipk	258 KB	IPK File	2/28/2018 10:00:46 AM	Пы	1 KB	4/3/2017	rwxrwx	root	
ghdrv-lib 1.1 armel.ipk	16 KB	IPK File	12/8/2017 8:26:16 AM	blankfb1	1 KB	4/3/2017	rwxrwx	root	
glibc_2.18.0_armel.ipk	1,277 KB	IPK File	2/22/2018 12:20:29 PM	boom	671 KB	1/15/2018 3:00 PM	rwxr-xr-x	root	
gpu-viv2_3.0.101+4.1	55,736 KB	IPK File	12/8/2017 8:25:04 AM	l 🗋 clr	1 KB	4/3/2017	rwxrwx	root	
killapp	1 KB	File	2/23/2018 2:16:02 PM	demo_10in.ipk	8,563 KB	1/15/2018 1:32 PM	rw-rr	root	
qt5_5.9.3_3Dxx.ipk	20,994 KB	IPK File	12/20/2017 2:58:38 PM	emmc_test.dat	1,024 KB	12/19/2017 10:57 AM	rw-rr	root	
readWriteFileSystem	1 KB	File	2/19/2018 10:34:00 AM	etc	2 KB	12/19/2017 11:38 AM	rwxr-x	root	
setup3Dxx	4 KB	File	3/5/2018 8:22:55 AM	gcclibs_4.8.3_armel.ipk	258 KB	2/28/2018 10:00 AM	rw-rr	root	
				ghdrv-lib_1.1_armel.ipk	16 KB	12/8/2017 8:26 AM	rwxr-x	root	
				glibc_2.18.0_armel.ipk	1,277 KB	2/22/2018 12:20 PM	rw-rr	root	
				glibc_2.18_armel.ipk	1,071 KB	1/18/2018 12:31 PM	rwxr-x	root	
				gpu-viv2_3.0.101+4.1	55,736 KB	12/8/2017 8:25 AM	rwxr-x	root	
				📄 killapp	1 KB	2/23/2018 2:16 PM	rwxrwx	root	
				🔄 linuximage	2,638 KB	12/20/2017 9:00 AM	rw-rr	root	~
0 B of 76.4 MB in 0 of 16				0 B of 125 MB in 0 of 30				2 h	nidden
							SCP 🗐	0:02:	49

- In the left hand pane, select all the files (<Ctrl>-a) and drag them to the target (right hand pane)
- If some files already exist overwrite them with the new ones

onfirm					2 X
Directory 'startup	' already exists. Overwrite?				
🔲 Never ask me again	Yes No	Cancel	Yes to A <u>l</u> I	No to All	Help

• Click "Yes to All"


63% Upl	loading	1		8 ×
P	File: C:\\gpu-\ Target: /home/	/iv2_3.0.1	01+4.1.1_arm	nel.ipk
	Time left: Bytes transferred:	0:00:06 55.6 MB	Time elapsed Speed:	: 0:00:13 5.12 MB/s
	🗙 _ 🗞 • 🔊 U	nlimited	÷	

• The right pane should look similar to:

🌆 targetRootFiles - gmd -	WinSCP						_		×
Local Mark Files Comm	nands <u>S</u> essio	n <u>O</u> ptions <u>R</u> emote	<u>H</u> elp						
🖶 🔀 👼 Synchronize	<b>F</b> 🖗 🛃	🛯 💮 🖓 Queue	Transfer Settings Default	- <i>💕</i> -					
💂 gmd 🚅 New Session	n								
🟪 C: OS	- 🔗 🔽 🕒	🔶 🔹 - 🔶 - 📄 🖻	1 🏠 🤁 😘	📕 home 🔹 🚰 [	7	🔶 - 🖻 🔁 🏠 🌮	🔍 Find Files 🧜	2	
📑 🕼 Upload 👻 📝 Edit 🗸	🗙 🛃 🕞	Properties 📑 New	v - 🛨 🖃 🗸	📲 Download 👻 📝 Edit	- X 🗹	🕞 Properties 📑 New	- + - V		
C:\QtGhSupport\targetRoot	tFiles∖			/home/					
Name	Size	Туре	Changed	Name	Size	Changed	Rights	Owner	
±		Parent directory	3/13/2018 8:21:59 AM	±		9/22/2017 4:06 PM	rwxr-xr-x	root	
fonts		File folder	3/13/2018 8:21:59 AM	demo7in		12/22/2017 10:57 AM	rwxr-sr-x	root	
startup		File folder	3/13/2018 8:21:59 AM	demo10in		1/15/2018 1:32 PM	rwxrwxr-x	1000	
stdos		File folder	3/13/2018 8:21:59 AM	demo10in_orig		1/12/2018 2:12 PM	rwxr-sr-x	root	
3Dxx_profile	1 KB	File	4/3/2017 4:02:00 PM	fonts		3/13/2018 9:04 AM	rwxr-xr-x	root	
3Dxx_profile.local	3 KB	LOCAL File	2/23/2018 2:07:38 PM	samegame		12/19/2017 5:14 PM	rwxr-sr-x	root	
bl	1 KB	File	4/3/2017 3:47:40 PM	startup		12/21/2017 1:33 PM	rwxrwx	root	
blankfb1	1 KB	File	4/3/2017 3:47:54 PM	stdos		2/23/2018 1:51 PM	rwxr-xr-x	root	
🗋 clr	1 KB	File	4/3/2017 3:48:00 PM	3Dxx_profile	1 KB	4/3/2017	rw-rr	root	
gcclibs_4.8.3_armel.ipk	258 KB	IPK File	2/28/2018 10:00:46 AM	3Dxx_profile.local	3 KB	2/23/2018 2:07 PM	rw-rr	root	
ghdrv-lib_1.1_armel.ipk	16 KB	IPK File	12/8/2017 8:26:16 AM	bl	1 KB	4/3/2017	rwxrwx	root	
📄 glibc_2.18.0_armel.ipk	1,277 KB	IPK File	2/22/2018 12:20:29 PM	blankfb1	1 KB	4/3/2017	rwxrwx	root	
gpu-viv2_3.0.101+4.1	55,736 KB	IPK File	12/8/2017 8:25:04 AM	boom 📄	671 KB	1/15/2018 3:00 PM	rwxr-xr-x	root	
📄 killapp	1 KB	File	2/23/2018 2:16:02 PM	📄 clr	1 KB	4/3/2017	rwxrwx	root	
dt5_5.9.3_3Dxx.ipk	20,994 KB	IPK File	12/20/2017 2:58:38 PM	demo_10in.ipk	8,563 KB	1/15/2018 1:32 PM	rw-rr	root	
readWriteFileSystem	1 KB	File	2/19/2018 10:34:00 AM	emmc_test.dat	1,024 KB	12/19/2017 10:57 AM	rw-rr	root	
📄 setup3Dxx	4 KB	File	3/5/2018 8:22:55 AM	etc	2 KB	12/19/2017 11:38 AM	rwxr-x	root	
				gcclibs_4.8.3_armel.ipk	258 KB	2/28/2018 10:00 AM	rw-rr	root	
				ghdrv-lib_1.1_armel.ipk	16 KB	12/8/2017 8:26 AM	rwxr-x	root	
				glibc_2.18.0_armel.ipk	1,277 KB	2/22/2018 12:20 PM	rw-rr	root	
				glibc_2.18_armel.ipk	1,071 KB	1/18/2018 12:31 PM	rwxr-x	root	
				gpu-viv2_3.0.101+4.1	55,736 KB	12/8/2017 8:25 AM	rwxr-x	root	
				📗 🛄 killapp	1 KB	2/23/2018 2:16 PM	rwxrwx	root	
				🗌 🛄 linuximage	2,638 KB	12/20/2017 9:00 AM	rw-rr	root	
				pingit.sh	1 KB	12/20/2017 9:13 AM	rwxr-xr-x	root	
				qt4_4.8.6_3Dxx.ipk	18,738 KB	1/11/2018 2:47 PM	rwxr-x	root	
				qt5_5.6.2_3Dxx.ipk	17,653 KB	1/11/2018 2:49 PM	rwxr-x	root	
				qt5_5.9.3_3Dxx.ipk	20,994 KB	12/20/2017 2:58 PM	rwxr-x	root	
				readWriteFileSystem	1 KB	2/19/2018 10:34 AM	rwxr-xr-x	root	
				setup3Dxx	4 KB	3/5/2018 8:22 AM	rwxr-xr-x	root	
				testserial.exe	9 KB	12/19/2017 5:27 PM	rwxr-xr-x	root	
				writeablefs	1 KB	3/5/2018 4:18 PM	rwxr-xr-x	root	
0 B of 76.4 MB in 0 of 16				0 B of 125 MB in 0 of 31				2	hidden
							SCP 🗐	0:10	):53



- Select "readWriteFileSystem" and "setup3Dxx" (<Ctrl> click)
- Right click  $\rightarrow$  Properties <F9>

🌆 home - gmd - WinSCP			- 0			_		Х
Local <u>M</u> ark <u>F</u> iles <u>C</u> omm	nands <u>S</u> essio	n <u>O</u> ptions <u>R</u> emote	Help					
🖶 🚼 📑 Synchronize	<b>F</b>	🛯 🛞 🕋 Queue	Transfer Settings Default	• 👩 •				
gmd 📑 New Session								
- C OS	- 😤 🔽 🗉	🦛 🗸 🐟 🗸 📄 🗖	a 🛆 🕾 🛼	home 🔹 🖾 🔽		🏠 🍠 🔯 Find Files	2	
							a	
		Properties	W • [ + ] • V			New - + - V	1	
C:\QtGhSupport\targetRoot	tFiles\	-	-	/home/				
Name	Size	Туре	Changed	Name	Size Changed	Rights	Owner	
<u>t</u>		Parent directory	3/13/2018 8:21:59 AM	<b>t</b>	9/22/2017 4:06	PM rwxr-xr-x	root	
fonts		File folder	3/13/2018 8:21:59 AM	demo7in	12/22/2017 10:5	7 AM rwxr-sr-x	root	
startup		File folder	3/13/2018 8:21:59 AM	demo10in	1/15/2018 1:32	PM rwxrwxr-x	1000	
stdos		File folder	3/13/2018 8:21:59 AM	demo10in_orig	1/12/2018 2:12	PM rwxr-sr-x	root	
3Dxx_profile	1 KB	File	4/3/2017 4:02:00 PM	fonts	3/13/2018 9:04	AM rwxr-xr-x	root	
3Dxx_profile.local	3 KB	LOCAL File	2/23/2018 2:07:38 PM	samegame	12/19/2017 5:14	PM rwxr-sr-x	root	
bl	1 KB	File	4/3/2017 3:47:40 PM	startup	12/21/2017 1:33	PM rwxrwx	root	
📄 blankfb1	1 KB	File	4/3/2017 3:47:54 PM	stdos	2/23/2018 1:51	PM rwxr-xr-x	root	
📄 clr	1 KB	File	4/3/2017 3:48:00 PM	3Dxx_profile	1 KB 4/3/2017	rw-rr	root	
gcclibs_4.8.3_armel.ipk	258 KB	IPK File	2/28/2018 10:00:46 AM	3Dxx_profile.local	3 KB 2/23/2018 2:07	PM rw-rr	root	
ghdrv-lib_1.1_armel.ipk	16 KB	IPK File	12/8/2017 8:26:16 AM	bl	1 KB 4/3/2017	rwxrwx	root	
glibc_2.18.0_armel.ipk	1,277 KB	IPK File	2/22/2018 12:20:29 PM	blankfb1	1 KB 4/3/2017	rwxrwx	root	
gpu-viv2_3.0.101+4.1	55,736 KB	IPK File	12/8/2017 8:25:04 AM	boom	671 KB 1/15/2018 3:00 I	PM rwxr-xr-x	root	
killapp	1 KB	File	2/23/2018 2:16:02 PM	Clr	1 KB 4/3/2017	rwxrwx	root	
at5 5.9.3 3Dxx.ipk	20,994 KB	IPK File	12/20/2017 2:58:38 PM	demo 10in.ipk 8,	563 KB 1/15/2018 1:32 I	PM rw-rr	root	
readWriteFileSystem	1 KB	File	2/19/2018 10:34:00 AM	emmc test.dat 1,	.024 KB 12/19/2017 10:5	7 AM rw-rr	root	
setup3Dxx	4 KB	File	3/5/2018 8:22:55 AM	l etc	2 KB 12/19/2017 11:3	8 AM rwxr-x	root	
				🗋 occlibs 4.8.3 armel.ip 😐 🔘	nen	M rw-rr	root	
				ghdry-lib 1.1 armel.ir		. I rwxr-x	root	
				glibc 2.18.0 armel.ipt	dit	M rw-rr	root	
				glibc 2.18 armel ink	ownload F5	M DAXE-Y	root	
				apu-viv2 3.0.101+4.1 🛐 Du	uplicate Shift+F5	1 rwxr-x	root	
				killapp M	Nove To Shift+F6	DWXDWY	root	
				Linuximage Y De	elete F8	M DW-FF	root	
				ningit sh	ename E2	M DAYT-Y-Y	root	
				at4 4 8 6 3Dyx ink	channe FZ	DAVE-XI-X	root	
				Fil	ile Custom Commands		root	
				at5 5 9 3 3Dw ink	ile Names		root	
				road/WriteFileSystem	roperties FQ		root	
				readwriterilesystem	A KD 2/5/2010 0.22 A	M PAGE VI	root	
				setupsux;	0 VP 12/11 Propertie	es (F9)		
				Lestserial.exe	1 KB 2/5/ D	 ()	DOT	
				writeablets	INB 3/3/4 Display/	change properties of	pot	
0 B of 76.4 MB in 0 of 16				4.10 KB of 125 MB in 2 of 31	selected		21	hidden
						🔒 SCP 🖻	0:13:	:04
							A	



• Make them executable by selecting all the "X" boxes (several clicks may be required to cycle back to the check mark

readWriteFileSy	stem, Properties
Common Che	cksum
	2 files
Location:	/home
Size:	3.71 KB (3,800 B)
Group:	root 👻
Owner:	root 👻
Permissions:	Owner       Image: R       Image: W       Image: X       Set UID         Group       Image: R       Image: W       Image: X       Set GID         Others       Image: R       Image: W       Image: X       Sticky bit         Octal:       0755
	OK Cancel <u>H</u> elp

• Click "OK"



# **Execute Configuration Scripts**

• From Commands select "Open in PuTTY"

📙   💆 📙 🔫   QtGhSu	upport								_	
File Home Sha	re View									
🌆 home - Grayhill Displa	y - WinSCP		- <u>h</u>					-		×
Local Mark Files Comr	mands Sessio	n Options Remote	Help							
🛄 🚉 🕞 Synchr 🖶	Compare Dire	ctories	Shift+F2	ar Sattings Default	• 💋 •					
Carata il Diantara 🚰	Keep Remote I	Directory up to Date.	Ctrl+U	a settings berault						
Grayniii Dispiay 粒	' Svnchronize	2.1	Ctrl+S			_ 1-			~	
🛀 C: OS	Synchronize B	rowsing	Ctrl+Alt+B	1	home 🔻 🚰 [	7	* 🗈 🗖 🎧 🎜	🔍 Find Files	<b>1</b> -	
🛛 🔐 Upload 👻 📝 🚡	Find Files		Δlt+F7	A	🛛 📄 Download 👻 📝 Edit	- X 🚽	Properties 🏼 🚰 New	- + - V		
C:\QtGhSupport\tar	Oueue				/home/					
Name	Static Custom	Commands			Name	Size	Changed	Rights	Owner	
<b>.</b>				:21:59 AM	<b>.</b>		9/22/2017 4:06 PM	rwxr-xr-x	root	
fonts	Open Termina	1	Ctrl+1	:21:59 AM	demo7in		12/22/2017 10:57 AM	rwxr-sr-x	root	
startup	Open in PuTT	Ŷ	Ctrl+P	:21:59 AM	demo10in		1/15/2018 1:32 PM	rwxrwxr-x	1000	
stdos	Clear Caches			:21:59 AM	demo10in_orig		1/12/2018 2:12 PM	rwxr-sr-x	root	
3Dxx_profile	Quit		F10	02:00 PM	fonts		3/13/2018 9:04 AM	FWXF-XF-X	root	
3Dxx_profile.local	3 KB	LUCAL File	2/23/2018 2	:07:38 PM	samegame		12/19/2017 5:14 PM	rwxr-sr-x	root	
bl	1 KB	File	4/3/2017 3:	47:40 PM	startup		12/21/2017 1:33 PM	FWXFWX	root	
blankfb1	1 KB	File	4/3/2017 3:	47:54 PM	stdos		2/23/2018 1:51 PM	rwxr-xr-x	root	
	1 KB	File	4/3/2017 3:	48:00 PM	3Dxx_profile	1 KB	4/3/2017	rw-rr	root	
gcclibs_4.8.3_armel.ipk	258 KB	IPK File	2/28/2018	10:00:46 AM	3Dxx_profile.local	3 KB	2/23/2018 2:07 PM	rw-rr	root	
glibc 2.18.0 armel.ipk	1 277 KB	IPK File	2/22/2018 1	20:10 AIVI	blankfh1	1 KB	4/3/2017	DACKDAC	root	
gnu-viv2 3.0.101+4.1	55 736 KB	IPK File	12/8/2017 8	25:04 AM	boom	671 KB	1/15/2018 3:00 PM	DAXE-XE-X	root	
killapp	1 KB	File	2/23/2018 2	2:16:02 PM	l cir	1 KB	4/3/2017	PWXPWX	root	
qt5_5.9.3_3Dxx.ipk	20,994 KB	IPK File	12/20/2017	2:58:38 PM	demo_10in.ipk	8,563 KB	1/15/2018 1:32 PM	rw-rr	root	
readWriteFileSystem	1 KB	File	2/19/2018 1	0:34:00 AM	emmc_test.dat	1,024 KB	12/19/2017 10:57 AM	rw-rr	root	
setup3Dxx	4 KB	File	3/5/2018 8:	22:55 AM	etc	2 KB	12/19/2017 11:38 AM	rwxr-x	root	
					gcclibs_4.8.3_armel.ipk	258 KB	2/28/2018 10:00 AM	rw-rr	root	
					ghdrv-lib_1.1_armel.ipk	16 KB	12/8/2017 8:26 AM	rwxr-x	root	
					glibc_2.18.0_armel.ipk	1,277 KB	2/22/2018 12:20 PM	rw-rr	root	
					glibc_2.18_armel.ipk	1,071 KB	1/18/2018 12:31 PM	rwxr-x	root	
					gpu-viv2_3.0.101+4.1	55,736 KB	12/8/2017 8:25 AM	rwxr-x	root	
					killapp	1 KB	2/23/2018 2:16 PM	PWXPWX	root	
					iinuximage	2,038 KB	12/20/2017 9:00 AM	rw-rr	root	
					at4.4.8.6.3Dyx ink	18 738 KB	1/11/2018 2·47 DM	TWXT-XT-X	root	
					at5 5.6.2 3Dxx.ipk	17 653 KB	1/11/2018 2:49 PM	DAXE-X	root	
					at5 5.9.3 3Dxx.ipk	20,994 KB	12/20/2017 2:58 PM	rwxr-x	root	
					readWriteFileSystem	1 KB	2/19/2018 10:34 AM	rwxr-xr-x	root	
					setup3Dxx	4 KB	3/5/2018 8:22 AM	rwxr-xr-x	root	
					testserial.exe	9 KB	12/19/2017 5:27 PM	rwxr-xr-x	root	
					writeablefs	1 KB	3/5/2018 4:18 PM	rwxr-xr-x	root	
0 B of 76.4 MB in 0 of 16					0 B of 125 MB in 0 of 31				2	hidden
								SCP 🗐	0:00	):34

• A PuTTY session is established (via the IP address as opposed to the initial serial based session used to derive the IP address)



• If this is the first connection to this IP address, the following will pop-up



• Click "Yes"





- Execute the script
  - o ./readWriteFileSystem

PuTTY (inactive)	_ 0	x
Using username "root".		~
running /etc/profile.local		
Turning on fb1		
Setting backlight to 100		
root@ghiimx6:~ ./readWriteFileSystem		
Making 3Dxx Flash File system writeable and adding writeablefs	script	
<pre>ln: /etc/rc.d/S03writeablefs: File exists</pre>		
Rebooting to make following steps run faster		
root@ghiimx6:~		
_		
		-

• The display will reboot, which terminates the PuTTY session



- Click "OK"
- Close the "PuTTY (inactive)" window
- Relaunch PuTTY (<Ctrl>-p)



- Execute the setup script
  - o ./setup3Dxx

PuTTY (inactive)	
Using username "root".	*
running /etc/profile.local	
Setting backlight to 100	
root@ghiimx6:~ ./setup3Dxx	
Setup Gravhill 3Dxx Display for Ot-5.9.3	
Mon Mar 5 16:20:27 CST 2018	
Disabling VUI Builder and other applications on 3Dxx	
Killing gh7indemo	
mv: can't rename '/etc/init.d/launchghvehicleapp': No such file or directory	
mv: can't rename '/etc/init.d/launchcodesvs': No such file or directory	
my: can't rename '/etc/init.d/launchgtdemo': No such file or directory	
mv: can't rename '/etc/init.d/launchgt7indemo': No such file or directory	
mv: can't rename '/etc/init.d/launchgt10indemo': No such file or directory	
Installing IPKs	
Updating GCC Libraries on 3Dxx Display	
Upgrading gcclibs on root from 4.7.3 to 4.8.3	
Removing obsolete file /usr/lib/libstdc++.so.6.0.17.	
Configuring gcclibs.	
Updating Grayhill I/O Libraries on 3Dxx Display	
Installing ghdrv-lib (1.1) to root	
Configuring ghdrv-lib.	
Updating glibc Libraries on 3Dxx Display	
Installing glibc (2.18.0) to root	
Configuring glibc.	
Updating GPU Libraries on 3Dxx Display	
Installing gpu-viv2 (3.0.101+4.1.1) to root	
Configuring gpu-viv2.	
Updating Qt5 Libraries on 3Dxx Display	
No packages removed.	
Installing qt593 (5.9.3) to root	
Configuring qt593.	
bootargs already set to console=ttymxc0,115200 lpj=7905280 rootfstype=ext4 root	
<pre>=/dev/mmcblk0p1 ro rootwait maxcpus=1 board-ghi_imx6.pn=3D2104TK-100</pre>	
Updating /etc/profile script	
Updating /etc/profile.local script	
Updating /usr/lib/fonts	
setup3Dxx completed successfully rebooting	
Mon Mar 5 16:22:07 CST 2018	
root@ghiimx6:~	
	$\overline{\mathbf{v}}$

N.B. The display resets once finished; repeat the above clean-up steps for closing stale windows

• Restore any custom modifications. The setup script preserved original copies as follows: /etc/profile.old /etc/profile.local.old



# Selecting a 3Dxx Qt Widget Demo Project

Qt Widget demonstration projects are provided for each of the 3Dxx Displays. There is a file in each demonstration program called "ghwrapper.cpp". This file is a focal point for the demonstration program's operation and in the very beginning of this file are comments explaining how the demonstration program works.

This table compares the features of the demonstration programs:

Program Name	ghqtdemo	gh7indemo	gh10indemo
Target Display	Model 3D50	Model 3D70	Model 3D2104
Orientation	Portrait	Landscape	Landscape
Real Time Clock setting	Yes	Yes	Yes
CAN input	Yes	Yes	Yes
CAN output	No	Yes	Yes
Touch Screen tap input	Yes	Yes	Yes
<b>Touch Screen Swipes</b>	Yes	Yes	Yes
Digital Inputs shown	4	4	4
Digital Outputs shown	4	4	4
Video inputs shown	2	3	3
Buzzer demo	N/A	Yes	Yes
Audio Output demo	N/A	Yes	N/A
Analog Input demo	N/A	Yes	N/A



# Build and Run a 3Dxx Embedded Application (Widget)

This section details how to build and run a demo application on the 3Dxx Display.

- Launch Windows Explorer (<Windows>-e)
- Navigate to C:  $\rightarrow$  Qt  $\rightarrow$  Tools  $\rightarrow$  QtCreator  $\rightarrow$  bin  $\rightarrow$  qtcreator.exe

🚱 🕞 🛛 📕 🕨 Computer 🕨 OS (C	:) ▶ Qt ▶ Tools ▶ QtCreator ▶ bin ▶		<b>▼</b> 49	Search bin		Q
<u>File Edit View Tools H</u> elp						
Organize ▼ 💼 Open ▼ Bu	ırn New folder				• ==	0
📙 translations 🔺	Name	Date modified	Туре	Size	*	
🐌 dist		12/3/2017 8:35 PM	Application extens	259 KB		
Docs	🚳 Qt5Test.dll	12/3/2017 8:35 PM	Application extens	156 KB		
📔 Examples	🚳 Qt5Widgets.dll	12/3/2017 8:35 PM	Application extens	4,300 KB		
📕 Licenses 🗐	🚳 Qt5Xml.dll	12/3/2017 8:35 PM	Application extens	147 KB		
\mu QtSupport	Qt5XmlPatterns.dll	12/3/2017 8:35 PM	Application extens	2,185 KB		
📕 gcc-linaro-2013	💷 qtcdebugger.exe	12/3/2017 8:29 PM	Application	33 KB		
🐌 GrayhillExamples	🥶 qtcreator.exe	12/3/2017 8:12 PM	Application	809 KB		
iargetSysroot	<pre>qtcreator_ctrlc_stub.exe</pre>	12/3/2017 8:08 PM	Application	12 KB		
🐌 Tools	<pre>qtcreator_process_stub.exe</pre>	12/3/2017 8:08 PM	Application	13 KB		
mingw530_32	QtcSsh4.dll	12/3/2017 8:09 PM	Application extens	1,481 KB		
🍌 bin	🔲 qtdiag.exe	12/3/2017 8:35 PM	Application	52 KB	1	No preview
🔒 etc	💷 qtpromaker.exe	12/3/2017 8:29 PM	Application	37 KB		dvdlidDie.
🍌 i686-w64-mingw3	🗾 sdktool.exe	12/3/2017 8:29 PM	Application	237 KB		
include	Sqlite4.dll	12/3/2017 8:08 PM	Application extens	759 KB		
🔒 lib	🚳 ssleay32.dll	12/3/2017 8:35 PM	Application extens	268 KB		
libexec	Timeline4.dll	12/3/2017 8:11 PM	Application extens	212 KB		
licenses	🚳 Utils4.dll	12/3/2017 8:09 PM	Application extens	1,411 KB		
🔒 opt	win32interrupt.exe	12/3/2017 8:39 PM	Application	97 KB		
📔 share	win64interrupt.exe	12/3/2017 8:42 PM	Application	112 KB	E	
QtCreator	📧 winrtdebughelper.exe	12/3/2017 8:29 PM	Application	11 KB		
📕 bin	🚳 xgejom.bat	12/3/2017 8:37 PM	Windows Batch File	1 KB		
📕 lib 👻	🖭 xgejom.xml	12/3/2017 8:37 PM	XML Document	1 KB	*	
1 item selected					👰 Computer	

- Right click to select options like
   "Pin to Taskbar"
   "Send to" → Desktop (create shortcut)
- Double click to launch Qt Creator



📴 Qt Creator				6 <b>6</b> 00	<b>P</b>	9.00	1		- <b>D</b> - X
<u>F</u> ile <u>E</u> dit <u>B</u>	uild <u>D</u> ebug <u>A</u> nalyze <u>T</u> ools	Wind	ow <u>H</u> elp	_	_	_	_	-	
Welcome	Projects		+ New Project		🖿 Open Proj	ect			
Edit	Examples	L	Sessions		Recent Projects	;			
Design	Tutorials	L	1 D default (last session)						
û Debug		L							
1	New to Qt?								
Projects	Learn how to develop your own applications and explore Qt Creator.	E							
Thep	Get Started Now	L							
	L Qt Account								
	Online Community								
	S Blogs								
Pale N	User Guide	-							
ί Γ	♀, Type to locate (Ctrl+K)		1 Issues 2 Search Results	3 Application Output	4 Compile Output	5 Debugger Console	8 Test Results	\$	• 🗉 🏾

• Click on "Open Project"



- Navigate to the desired project (C:  $\rightarrow$  QtGhSupport  $\rightarrow$  GrayhillExamples  $\rightarrow$  gh7indemo)
- Select gh7indemo.pro

🞯 Open File							×
← → ~ ↑ 🔒 > Th	is PC > OS (C:) > QtGhSupport > Gra	yhillExamples > gh7indemo >	•	✓ <sup>™</sup> Se	earch gh7indemo		٩
Organize 🔻 New folde	er				III -		?
	Name	Date modified	Туре	Size			
Transformation of the second s	content	4/6/2018 10:04 AM	File folder				
\land OneDrive	📙 images	4/6/2018 10:04 AM	File folder				
This PC	🖻 gh7indemo.pro	3/13/2018 9:50 AM	Qt Project file	3 K	В		
Network	samegame.qmlproject	2/8/2018 9:33 AM	QMLPROJECT File	1 K	В		
File <u>n</u>	ame: gh7indemo.pro			~	All Projects (*.pro *.qn	nlproject	$\sim$
				0	<u>O</u> pen	Cancel	

- Click "Open"
- If the following box appears, click "Yes"

🞯 Settin	gs File for "gh7indemo" from a different Environment? X
2	No .user settings file created by this instance of Qt Creator was found.
	Did you work with this project on another machine or using a different settings path before?
	Do you still want to load the settings file "C:\QtGhSupport\GrayhillExamples \gh7indemo\gh7indemo.pro.user"?
	Yes No

• If the following box appears, click "OK". **Refer to Appendix B:** Configuring a 3Dxx Project before continuing. The current project configuration file is not compatible with the current version of Qt Creator and the project's settings need to be re-configured.





- Select "Projects" view
- Select "Build" under "Qt-5.9.3-3Dxx"

	😰 gh7inden	no - Qt Creator		-		×
	<u>File</u> dit	<u>B</u> uild <u>D</u> ebug <u>A</u> nalyze <u>L</u> ools <u>W</u> ind	ow <u>H</u> elp			
	Welcome Edit	Manage Kits Import Existing Build	<b>~</b>	Build Settings Edit build configuration: Debug V Add V Remove Rename General		^
	Design	Active Project gh7indemo v	•	Shadow build:  Shadow	Browse	
<u> </u>	Tebug	Build & Run		Build Steps		
<b></b> /	Projects	Desktop Qt 5.9.3 MinGW 32bit Build		qmake: qmake.exe gh7indemo.pro -spec devices\jinux-imx6-g++ "CONFIG+=debug" "CONFIG+=qml_debug" hw_present=30	Details 🔻	
	? Help	► Run Qt-5.9.3-3Dxx	_	Make: mingw32-make.exe in C:\QtGhSupport\GrayhilExamples\build-gh7ndemo-Qt_5_9_3_3Dxx-Debug Add Build Step	Details 🔻	
		Run		Clean Steps		
	gh7indemo	Project Settings		Make: mingw32-make.exe dean in C:\QtGhSupport\GrayhilExamples\build-gh7indemo-Qt_5_9_3_3Dxx-Debug	Details 🔻	
	Debug	Editor Code Style Dependencies Clara Static Academic		Add Clean Step * Build Environment		
		Clang Static Analyzer		Use System Environment and Set <u>Path</u> to C:\QtGhSupport\gcc-linaro-2013\bin;C:\QtGhSupport\gcc-linaro-2013\bin;C:\Prc	Details 🔻	~
	>	■ P. Type to locate (Ctrl+K)	< 1 Issues 2 2 5	sarch Results 3 Application Output 🗧 Compile Output 5 Debugger Console 6 General Messages 8 Test Results 🗢	•	> /

• Click on the green arrow to run (a check to see if the executable is up to date is performed; if compilation is necessary the output can be viewed by clicking on the "Compile Output" tab)

🞯 gh7ind	emo - Qt	Creator					- 0	×
<u>F</u> ile <u>E</u> dit	<u>B</u> uild	<u>D</u> ebug	Analyze	Tools	Window	w Help		
	Projects			₹. ⊖		$\langle \rangle$ <no document=""> <math>\mathbf{v}    imes  </math></no>		8+
Welcome	> 👝 g	h7inden	10			Open a document		
Edit						File > Open File or Project (Ctrl+O)		
1						• File > Recent Files		
Design						<ul> <li>Tools &gt; Locate (Ctrl+K) and</li> <li>type to open file from any open project</li> </ul>		
tt Debug						- type c <space><pattern> to jump to a class definition</pattern></space>		
ير						<ul> <li>type m<space><pattern> to jump to a function definition</pattern></space></li> <li>type f<space><filename> to onen file from file system</filename></space></li> </ul>		
Projects						colort one of the other filtere for jumping to a location		
🕜 Help						Application Output   🛓 < > 🕨 🗍 🗽 + —		~ 🖂
qh7indemo						gh7indemo (on Remote Device) 🖸		
Ē.,						res-sec: 0, res-nsec: 1		^
	Open Do	tuments		•	8+ 📼	time-sec: 3639, time-nsec: 265197332		
Debug					<u></u>	GPIO initial output: 0x0 input: 0x0		
						Light level= 8		
						light level= 8		
- AK						User requested stop. Shutting down		
					~			~
	<b>□</b> <i>&gt;</i>	Type to	locate (C	trl+K)		1 Issues 2 Search Results 3 Application Output 4 Complie Output 5 Debugger Console 6 General Messages 8 Test Results ≑		

- Select the "Application Output" tab
- Click the red (when application is running on target) square to terminate the target session



# Appendix A: Configuring a Manual Qt Kit for Grayhill Displays

Note: This appendix is included for reference and is not a required installation step; Grayhill automatically installs the kit configuration as part of the support file installation. A kit is a collection of utilities (qmake, compilers, debugger, etc...) used to build a project.

o⊮ gh <u>E</u> ile	7indemo - Qt Creator Edit Build Debug Analyze Iools Window He	elp	
Welco Ed	Manage Kits Import Existing Build	Build Settings Edit build configuration: Debug  Add  Remove Rename General	
Des	Active Project gh7ndemo	Shadow build: Build directory: C:\Qt\QtSupport\GrayhilExamples\build-gh7indemo-Qt_5_9_3_3Dxx-Debug	Browse
	build & Kun □ Desktop Qt 5.9.3 MinGW 32bit ects → Build ► Run	Build Steps         qmake: gmake.exe gh7indemo.pro -spec devices\linux-imx6-g++ "CONFIG+=debug" "CONFIG+=gml_debug"         Make: make not found in the environment.	Details 👻
He	le Qt-5.9.3-3Dxx → Build ► Run	Add Build Step  Clean Steps	
gh7ini Det	Aemo Project Settings Editor Code Style Dependencies	Make: make not found in the environment.          Add Clean Step *         Build Environment	Details 🕶
	Clang Static Analyzer	Use System Environment	Details 💌
	Cype to locate (Ctrl+K)     I Issue	ues 😰 2 Search Results 3 Application Output 4 Compile Output 5 Debugger Console 6 General Messages 8 Test Results 💠	<b>▲</b> 🔲

• To see the list of available kits, select the "Projects" view

The above image illustrates the presence of two kits.

Should another kit be desired; these instructions describe the procedure for installing a Qt Creator kit.

• Click on "Manage Kits" (this is the same as selecting Tools  $\rightarrow$  Options )



- Select "Build & Run"
- Select the "General" tab

options	and the second s		
Filter	Build & Run		
Filter	Build & Run         General       Kits       Qt Versions       Compilers       Debuggers       Qbs       Ch         Projects Directory <ul> <li>Current directory</li> <li>Directory</li> <li>I'src/Qt/Windows</li> </ul> Build and Run <li>Save all files before build</li> <li>Always build project before deploying it</li> <li>Always deploy project before running it</li> <li>Open Compile Output pane when building</li> <li>Open Application Output pane on output when running</li> <li>Open Application Output pane on output when debugging</li> <li>Always ask before stopping applications</li> <li>Stop applications before building:</li> <li>Stop applications before building:</li> <li>Use jom instead of nmake join is a drop-in replacement for <i>ranske</i> which distributes the compilation p official releases/jom/. Disable it if you experience problems with your buil</li> <li>Default build directory:</li> <li>whold-%/Current%repict:Name)-%/Current%it:Filed</li>	Aake	new run
QA Testing			OK Cancel Apply

The "General" tab is where project wide customization is done. Review and select the desired configuration.



#### Device

The section describes how to establish an Ethernet based connection to the display.

- Select "Devices"
- Click "Add..."

or Options	and here and	×
Filter	Devices	
Environment	Devices Android QNX	
Text Editor	Device: Local PC (default for Desktop)	<u>A</u> dd
FakeVim	General	Remove
P Help	Name: Local PC Type: Desktop	Set As Default
{} C++	Auto-detected: Yes (id is "Desktop Device")	Show Running Processes
Qt Quick	Current state: Unknown	
🚯 Build & Run	Type Speafic	
ᇞ Debugger		
💓 Designer		
Analyzer		
Version Control		
Devices		
Code Pasting		
QA Testing		
	ОК	Cancel Apply



😳 Device Configuration	Wizard Selection
Available device types:	
Generic Linux Device	
QNX Device	
	Start Wizard Cancel

- Select "Generic Linux Device"
- Click "Start Wizard"



w Generic Linux Dev	vice Configuration Setup	
Connection	Connection	
Summary	The name to identify this configuration: 3Dxx Target	
	The username to log into the device:	
	The authentication type:   Password  Key  Agent  The user's password:	
	The file containing the user's private key: :\Users\admin\.ssh\id_rsa Browse	
	Next	Cancel

- Populate the fields as illustrated above
- N.B. The IP address associated with gmd was configured in *hosts* (C:\Windows\System32\drivers\etc)
- Click "Next"



	en territor (setting linear)	x
O New Generic Li	nux Device Configuration Setup	
Connection	Summary	
之 Summary	The new device configuration will now be created.	
	In addition, device connectivity will be tested.	
		<u>Finish</u> Cancel

- Verify the 3Dxx Display is still powered up
- Click "Finish" The Ethernet link to the 3Dxx Display will be tested and if successful the following result screen appears



• Click "Close"



ter	Devices		
Environment	Devices Android QNX		
Text Editor	Device: 3Dxx Target (default for Ge	neric Linux)	▼ <u>A</u> dd
	General		<u>R</u> emove
Help	Name: 3Dxx Target		Set As Default
} c++	Type: Generic Linux Auto-detected: No		Test
Dt Owiek	Current state: Unknown		Show Running Processes.
	Type Specific		Deploy Public Key
Build & Kun	Machine type: Physical	Device	
🔉 Debugger	Authentication type:      Pass	sword 🔘 Key 🔘 Key via ssh-agent	
🗶 Designer	Host name: gmd	SH port: 22 🚖 🗌 Check host k	ey
Analyzer	Free ports: 10000-1	10100 Timeout: 10s 🜩	
Version Control	Username: root		
	Password:	Show password	
Devices	Private key file:	Browse Create New	
Code Pasting	GDB server executable: Leave e	mpty to look up	
A Testing			

• Click the upper arrow on the right side of the "Timeout:" box to increase timeout value to "20s"

er 🖉	Devices Android QNX	
Text Editor	Device: 3Dxx Target (default for Generic Linux)	▼ <u>A</u> dd
EakeVim	General	<u>R</u> emove
Help	Name: 3Dxx Target	Set As Default
} (++	Type: Generic Linux Auto-detected: No	Test
Ot Quick	Current state: Unknown	Show Running Processes.
Build & Run	Type Specific	Deploy Public Key
Debugger	Machine type:     Physical Device       Authentication type: <ul> <li>Password</li> <li> <u>K</u>ey</li> <li>             Key via ssh-agent</li> </ul>	
🕻 Designer	Host name: gmd SSH port: 22 🚔 🗐 Qheck host k	ey
Analyzer	Free ports: 10000-10100 Timeout: 🔯s 🚖	
Version Control	Username: root	
Devices	Private key file: Browse Create New	
Code Pasting	GDB server executable: Leave empty to look up	
A Testing		



• Devices Summary

Options	×
Filter	Devices
Environment	Devices Android QNX
Text Editor	Device: 3Dxx Target (default for Generic Linux)
FakeVim	General
P Help	Name: 3Dxx Target Set As Default Set As Default
{} C++	Auto-detected: No
Qt Quick	Current state: Unknown Show Running Processes
🕕 Build & Run	Type Specific Deploy Public Key Machine type: Physical Device
Debugger	Authentication type:   Password  Key  Key Via ssh-agent
🔀 Designer	Host name: 192. 168. 40.89 SSH port: 22 🚔 🔲 Check host key
Analyzer	Free ports: 10000-10100 Timeout: 20s
Version Control	Password:  Show password
Devices	Private key file: Browse Create New
Code Pasting	GDB server executable: Leave empty to look up
QA Testing	
	OK Cancel Apply

- Name name of the device
- Host name can be "alias" like *gmd* specified in *hosts* or a hard coded IP
- Timeout 20s
- Username root

#### N.B. Remember to "Test" to make sure connectivity has been established



# Compiler

- Select "Build & Run"
- Select "Compilers" tab
- Click "Add"; then select GCC  $\rightarrow$  C

🞯 Options		×	
Filter	Build & Run		
Environment	General Kits Qt Versions Compilers Debuggers Qbs CMake		
Text Editor	Name Туре	Add 🔻	
	✓ Auto-detected	MinGW 🕨	1
Fakevim	MinGW 5.3.0 32bit for C MinGW	GCC 🔸	C
👔 Help	✓ C++	Clang 🕨	C++
{} C++	MinGW 5.3.0 32bit for C++ MinGW	Custom 🕨	
	C	QCC	
Qt Quick	C++		
🕕 Build & Run			
Sebugger			
💓 Designer			
Analyzer			
Version Control			
Devices			
Code Pasting			
	OK Cancel	Apply	



- Populate the fields as illustrated
  - "Name:" ARM-GCC

"Compiler path:" Click "Browse..." and navigate to the desired file C:\QtGhSupport\gcc-linaro-2013\bin\ arm-linux-gnueabi-gcc.exe

💷 Choose Executable							×
← → ~ ↑ <mark> </mark> → T	his PC	aro-2013 > bin		✓ Ö Sea	rch bin		٩
Organize 👻 New fold	ler				== -		?
	Name	Date modified	Туре	Size			^
> 📌 Quick access	📧 arm-linux-gnueabi-dwp.exe	1/18/2018 7:26 PM	Application	3,837 KB			
> 🐔 OneDrive	📧 arm-linux-gnueabi-elfedit.exe	1/18/2018 7:26 PM	Application	965 KB			
	📧 arm-linux-gnueabi-g++.exe	1/18/2018 7:26 PM	Application	619 KB			
> 🛄 This PC	📧 arm-linux-gnueabi-gcc.exe	1/18/2018 7:26 PM	Application	617 KB			
> 鹶 Network	📧 arm-linux-gnueabi-gcc-4.8.3.exe	1/18/2018 7:26 PM	Application	617 KB			
-shr	🔳 arm-linux-gnueabi-gcc-ar.exe	1/18/2018 7:26 PM	Application	42 KB			~
File <u>r</u>	name: arm-linux-gnueabi-gcc.exe			~ AI	Files (*)		$\sim$
				C	<u>O</u> pen	Cancel	

Click "Open" "ABI:" Select "a

Select "arm-linux-generic-elf-32bit"

• The configuration portion of the screen should look similar to:

😳 Options		×
Filter Build & Run		
Environment ^ General Kits Qt	Versions Compilers Debuggers Qbs CMake	
Text Editor	Туре	Add 🔻
FakeVim C		Clone
Help ARM GCC	(Linaro 2013) GCC	Remove
C++ MinGW 5.	3.0 32bit for C++ MinGW	
Qt Quick ARM G++	(Linaro 2013) GCC	
Build & Run GCC	GCC	,
🔍 Debugger		
Mame:	ARM-GCC	
Compiler path:	C:\QtGhSupport\gcc-linaro-2013\bin\arm-linux-gnueabi-gcc.exe	
Platform codegen flags Version Control Platform linker flags:		
Devices	arm-linux-generic-elf-32bit 🔻 arm 🔻 - linux 🔻 - generic 👻 - elf 💌 - 32bit 💌	
Code Pasting		
	OK Cancel	Apply



• Repeat the above steps for  $GCC \rightarrow C++$ 

😳 Options			×
Filter	Build & Run		
Environment	General Kits Qt Versio	ns Compilers Debuggers Qbs CMake	
Text Editor	Name	Type	Add 🔻
FakeVim	× C++		Clone
Help	MinGW 5.3.0 32 ARM G++ (Lina	:bit for C++ MinGW aro 2013) GCC	Remove
{} C++	✓ Manual ✓ C		
Qt Quick	GCC	GCC	
🕕 Build & Run	GCC	GCC	/
🔍 Debugger			
💥 Designer	Name: AR	M-G++	
Analyzer	Complier path: C:	Qtansupport/gcc-iinaro-2013/pin/arm-iinux-gnueaoi-c++,exe browse	1
Version Control	Platform linker flags:		]
Devices	<u>A</u> BI: arn	n-linux-generic-elf-32bit 🔻 arm 🔻 - linux 🍸 - generic 🔻 - elf 🔻 - 32bit 🔻	1
Code Pasting			
		OK Cancel	Apply

• Click "Apply"



### Debugger

- Select "Debuggers" tab
- Click "Add"
- Populate the fields as illustrated

"Name:" 3Dxx Target Debugger "Path:" Click "Browse..." and navigate to the desired file C:\QtGhSupport\debugger\arm-linux-gnueabi-gcc.exe

💷 Choose Executable								×
$\leftarrow \rightarrow \cdot \uparrow$	> This PC > OS (C:) > Qt	GhSupport > debugger	>		✓ <sup>7</sup> / <sub>2</sub>	Search debugger		Q
Organize 🔻 New	/ folder					===	•	?
1 Ouishaaaaa	^ Name	^	Date modified	Туре	Size			^
Quick access	lib		3/13/2018 1:13 PM	File folder				
ineDrive 🍊 🍊	gdb-arm-none-	inux-gnueabi.exe	4/21/2012 10:27 AM	Application	3,618 KB			
This PC	libexpat-1.dll		4/21/2012 10:27 AM	Application extens	429 KB			
- 11131 C	libiconv-2.dll		4/21/2012 10:27 AM	Application extens	1,228 KB			
A Network	× 🗟		4/21/2012 10.27 ***	A	חש רדר ר			×
1	File <u>n</u> ame: gdb-arm-none-li	nux-gnueabi.exe			~	All Files (*)		$\sim$
						<u>Open</u>	Cancel	

• Click "Open"; the configuration portion of the screen should look similar to

🤨 Options		_			
Filter	Build & Run				
Environment	General Kits Qt Vers	ions Compilers	Debuggers Qbs CMake		
Text Editor	Name		Location	Туре	Add
FakeVim	GNU gdb 7.10.1 fc	or MinGW 5.3.0 32bit MinGW\bin\adb.exe	C:\Qt\Tools\mingw530_32\bin\gdb.exe c:\MinGW\bin\adb.exe	GDB GDB	Clone
Help	Manual     BDxx Target Det	ugger	C:\Ot\OtSupport\debugger\gdb-arm-pope-linux-	gnuezhi.exe GDB	Remove
C++			מוערועיטארייוטטטאט אווו ווטוע שוער	gine ability and a set	
Qt Quick					
Build & Run					
Debugger					
Designer	Name: 3Dxx	Target Debugger			
Analyzer	Path: C:\Q	t\QtSupport\debugger\	gdb-arm-none-linux-gnueabi.exe	Browse	
	Type: GDB				
Code Pasting	ABIs: arm- Version: 7.4.	)			
QA Testing	Working directory:	•		Browse	
				OK Cancel	Apply

• Click "Apply"



#### qmake

- Select the "Qt Versions" tab
- Click "Add" (Select a qmake Executable dialog box appears; still referencing the last path)
- Navigate to the provided qmake version C:\QtGhSupport\qmakeInsatll\bin\qmake.exe

🞯 Select a qmake Exec	utable								×
← → * ↑ 📙	$\leftarrow$ $\rightarrow$ $\checkmark$ $\uparrow$ $\square$ $\rightarrow$ This PC $\rightarrow$ OS (C:) $\rightarrow$ QtGhSupport $\rightarrow$ qmakeInstall $\rightarrow$ bin $\checkmark$ $\heartsuit$ Search bin								
Organize 🔻 New	folder							-	?
📌 Quick access	^	Name	^	Date modified	Туре	Size			
		📧 qmake.exe		3/8/2018 2:46 PM	Application	3,845 KB			
i OneDrive									
💻 This PC									
A Network	~								
I	File <u>n</u> ar	ne: qmake.exe				~	qmake (qmake*)		$\sim$
							<u>O</u> pen	Cance	

- Click "Open"
- Update "Version name:" to "Qt-5.9.3-3Dxx"

🞯 Options		×
Filter	Build & Run	
Environment	General Kits Qt Versions Compilers Debuggers Qbs CMake	
Text Editor	Name qmake Location	Add
FakeVim	<ul> <li>Auto-detected</li> <li>Qt 5.9.3 MinGW 32bit C:\Qt\5.9.3\mingw53_32\bin\qmake.exe</li> <li>Manual</li> </ul>	Remove
Help	Qt-5.9.3-3Dxx C:\QtGhSupport\qmakeInstall\bin\qmake.exe	Clean Up
{} C++		
Qt Quick		
🕕 Build & Run		
🔍 Debugger		
💓 Designer		
Analyzer		
Version Control	Version name: Qt-5.9.3-3Dxx	
Devices	gmake location: C: \QtGhSupport\gmakeInstall\bin\gmake.exe Browse	
Code Pasting	Qt version 5.9.3 for Embedded Linux Details 🔻	
	OK Cancel	Apply



#### Kit

- Select the "Kits" tab
- Click "Add"
- Populate the fields as illustrated

"Name:" Qt-5.9.3-3Dxx "Device type:" Select "Generic Linux Device" from the pick list N.B. Automatically updates Device "Sysroot": Click "Browse..." and navigate to desired path C:\QtGhSupport\targetSysroot

😳 Choose Directory							Х
$\leftarrow \rightarrow \cdot \uparrow$	> This	PC > OS (C:) > QtGhSupport	t		√ Č	Search QtGhSupport	P
Organize 🔻 Ne	w folder						?
	^	Name	Date modified	Туре	Size		^
📌 Quick access		Perl64	3/13/2018 1:13 PM	File folder			
ConeDrive		Python27	3/13/2018 1:13 PM	File folder			- 6
OneDrive		🔤 qmakeInstall	3/13/2018 1:13 PM	File folder			
💻 This PC		targetRootFiles	3/13/2018 1:13 PM	File folder			
A Network	~	argetSysroot	3/13/2018 1:13 PM	File folder			~
	Folder:	targetSysroot					
		L			C	Select Folder Cance	el

Click "Select Folder"		
"Compiler: C:	Select "ARM-GCC" from the pick list	
"Compiler: C+	" Select "ARM-G++" from the pick list	
"Debugger:"	Select "3Dxx Target Debugger" from the pic	ck list
"Qt version:"	Select "Qt-5.9.3-3Dxx" from the pick list	

N.B. The selected names match those used when creating the various kit sub-components

😳 Options			×
Filter	Build & Run		
Environment	General Kits Qt Version	s Compilers Debuggers Qbs CMake	
Text Editor	Name		Add
EakeVim	<ul> <li>Auto-detected</li> <li>Desktop Ot 5.9.3</li> </ul>	MinGW 32bit (default)	Clone
	✓ Manual		Remove
(?) Help	<b>Qt-5.9.3-3Dxx</b>		Make Default
{} C++			
Qt Quick	Name:	Qt-5.9.3-3Dxx	<b>"</b>
Duild & Dun	File system name:		
	Device type:	Generic Linux Device	
🤍 Debugger	Device:	3Dxx Display (default for Generic Linux)	Manage
📡 Designer	Sysroot:	C:\QtGhSupport\targetSysroot	Browse
Analyzer		C: ARM-GCC	
Version Control	Compiler:	C++: ARM-G++	Manage
	Environment:	No changes to apply.	Change
Devices	Debugger:	GNU gdb 7.10.1 for MinGW 5.3.0 32bit	Manage
Code Pasting	Ot version:	0t-5 9 3-30vv	Manage
QA Testing	Ot releases		Hanagetti
_	Quinkspec:		
	CMake Tool:	*	Manage
	CMake generator:	<none> - <none>, Platform: <none>, Toolset: <none></none></none></none></none>	Change
	CMake Configuration	$CMAKE_CXX_COMPILER:STRING=\%\{Compiler:Executable:Cxx\}; CMAKE_C_COMPILER:STRING=$	Change
	Additional Qbs Profile Settings		Change
		OK Cancel	Apply

Grayhill

- Verify contents are correct
- Click "OK"

Now that a Qt kit is configured; it is possible to develop, build, test, debug, run and enjoy Qt applications.



# Appendix B: Configuring a 3Dxx Project

Note: This appendix is included for reference and is not a required installation step; Grayhill automatically configures the project as part of the support file installation.

This section details how to setup and configure a new project for the 3Dxx Display.

If not already running, launch Qt Creator. (See Build and Run a 3Dxx Embedded Application)

Open the gh7indemo project from "Qt Creator" main window click on "Open Project" button.

N.B. If present, a previous project can be opened by clicking on the project name listed below "Recent Projects".





- An "Open File" dialog window will appear
- Navigate to the 3Dxx Demo project's ".pro" file (and click to select) C:\QtGhSupport\GrayhillExamples\gh7indemo\gh7indemo.pro

💷 Open File						×
← → • ↑ 📙	> This PC > OS (C:) > QtGhSuppo	rt > GrayhillExamples > gh7indemo		✓ <sup>™</sup> S	earch gh7indemo	Q
Organize 🔻 New	w folder					
👆 Downloads	^ Name	Date modified	Туре	Size		
b Music	content	3/13/2018 1:12 PM	File folder			
Pictures	images	3/13/2018 1:12 PM	File folder			
📑 Videos	pro gh7indemo.pro	3/13/2018 9:50 AM	Qt Project file	3 KB		
🟪 OS (C:)	samegame.qmlproject	2/8/2018 9:33 AM	QMLPROJECT File	1 KB		
	File <u>n</u> ame: gh7indemo.pro			~ /	All Projects (*.pro *.qbs	*.pyqtc \vee
				(	<u>Open</u>	Cancel

- Click "Open"
- If the "*project*.pro.user" file is missing, which is normal if the project has never been opened before, a "Configure Project" dialog appears. If this dialog doesn't appear, proceed to where the "Projects" icon is selected.
- If the "Configure Project" dialog appears (remember screen shot illustrations are for reference purposes and may not reflect current observations)





"Desktop Qt 5.9.3 MinGW 32bit"

• Expand by clicking on "Details" Unselect "Release" Unselect "Profile"

"Qt-5.9.3-3Dxx"

• Expand by clicking on "Details"

Select "Qt-5.9.3-3Dxx" (this selection will select the three boxes below) Unselect "Release" Unselect "Profile"



• Click "Configure Project"



• On the main "Qt Creator" window select "Projects"

Cy gh7indemo Elle Edit Bu Welcome Edit	Qt Creator uild <u>Debug</u> <u>Analyze</u> <u>Tools</u> <u>Window</u> <u>Help</u> Manage Kits Import Existing Buld Active Project		Build Settings Edit build configuration: Debug  Add  Remove Rename General Shadow built	
Debug Projects Pol	Build & Run Desktop Qt 5.9.3 MinGW 32bit Build Run		Build directory:       C:\Qt\QtSupport\GrayhllExamples\build-gh7indemo-Desktop_Qt_5_9_3_MinGW_32bit-Debug         Build directory:       C:\Qt\QtSupport\GrayhllExamples\build-gh7indemo-Desktop_Qt_5_9_3_MinGW_32bit-Debug         gmake:       gmake.exe       gh7indemo.pro -spec win32-g ++ "CONFIG += debug" "CONFIG += gml_debug"         Make:       mingw32-make.exe       n: C:\Qt\QtSupport\GrayhllExamples\build-gh7indemo-Desktop_Qt_5_9_3_MinGW_32bit-Debug	Browse Details ▼ Details ▼
gh7indemo ↓↓ Debug	Project Settings Editor Code Style Dependencies Clang Static Analyzer		Add Build Step  Clean Steps Make: mingw32-make.exe dean in C:\Qt\QtSupport\GrayhilExamples\build-gh7indemo-Desktop_Qt_5_9_3_MinGW_32bit-Debug Add Clean Step  Build Environment Use System Environment	Details 💌
	P. Type to locate (Ctrl+K) 1 Issues	s 2 Search F	reaults 3 Application Output 4 Comple Output 5 Debugger Console 6 General Messages 8 Test Results ≎	A

- If the desired kit is not shown see Appendix A: Configuring a Manual Qt Kit for Grayhill Displays
- N.B. Clicking "Manage Kits" is the same as selecting "Tools  $\rightarrow$  Options"

"Active Project" is a drop down pick list with the active project shown.

"Build & Run" lists the available kits.

N.B. The selected kit is emphasized in **bold**. A kit (set of utilities) is how the project will be built, e.g. the main kit difference is the compiler as the Qt-5.9.3-3Dxx kit uses a cross compiler for the display.

N.B. Clicking on an actual kit name selects either Build or Run (depending on which one was previously selected)



#### Build

This is a target (3Dxx Display) build example walk-through; select "Build".

- Expand the Details tab associated with qmake (under Build Steps)
- "Additional arguments" Enter "hw\_present=3D70" N.B. This is a **case sensitive** field.

N.B. the parameter is automatically added to the "effective qmake call" command syntax. This field is configured based on the actual target hardware display size.

💷 gh7inde	mo - Qt Creator					-		×
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? Help	Run     Qt-5.9.3-3Dxx     Build		qmake build configuration:         Debug           Additional arguments:         hw_present	-3D70			<mark>Д</mark> в	
	Run		Enable QML debugging and profiling:	t make your application vulnerable. Only use in a	a safe environment.			
	Editor Code Style		Effective qmake call: +=debug*	C:\QtGhSupport\GraybillEvappler\gbZodemo\gb CONFIG+=qml_debug_hw_present=3D70_&m	i7indemo.pro -spec devices\inux-imx6-g++ "CC ake qmake_all	ONFIG		
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-	Cype to locate (Ctrl+K)     I Issue	es 🚯 2 Se	rch Results 3 Application Output 4 Compile C	utput 5 Debugger Console 6 General Me	ssages 8 Test Results 🗢		•	



- Expand the "Details" tab associated with "Make" under "Build Steps"
- Click on "Browse"
  - Navigate to C:  $\rightarrow$  Qt  $\rightarrow$  Tools  $\rightarrow$  mingw530\_32  $\rightarrow$  bin Select mingw32-make.exe Click "Open"

😵 Choose Executable									Х
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		📧 nm.exe	12/28/2015 2:42 PI	M Application	823 K	В			- 17
	~	objcopy.exe	12/28/2015 2:42 PI	M Application	982 K	В			~
F	ile <u>n</u> ar	me: mingw32-make.exe			~	All Files (*)			$\sim$
						<u>O</u> pen		Cancel	

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Т.	Build & Run						
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Durningha	Desktop Qt 5.9.3 MinGW 32bit		amake: amake.exe ah7indemo.pro -spec devices\linux-imx6-a++ "CONFIG+=debua" "CONFIG+=aml debua" hw present=30	Details 🔻			
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p	→ Build		Override make: C:\Ot\Tools\mingw530 32\bin\mingw32-make.exe	owse			
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<b>,</b>	Clang Static Analyzer		Make: make not found in the environment.	Details 🔻			
Debug			Add Clean Step ▼				
			Build Environment				
			Use System Environment	Details 🔻			
-	Cype to locate (Ctrl+K)     I Issue	s 🚯 2 Se	arch Results 3 Application Output 4 Compile Output 5 Debugger Console 6 General Messages 8 Test Results 🗢	-			



- Expand the "Details" tab associated with "Make" under "Clean Steps"
- Copy and paste the contents of "Override make:"from "Build Steps" to "Clean Steps"

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Welcome Edit	Manage Kits Import Existing Build	~	Build Settings Edit buld configuration: Debug  Add  Remove Rename General			
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Projects	ild 🎤 Build		qmake: qmake.exe gh7indemo.pro -spec devices\inux-imx6-g++ "CONFIG+=debug" "CONFIG+=qml_debug" hw_present=31	Details 🔻	•	
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>					_	
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- Expand the "Details" tab associated with "Use System Environment" under "Build Environment"
- Scroll down to "Path" and double click to edit

#### N.B. The entire contents are selected; press the right arrow key before typing

• Append "C:\Qt\5.9.3\mingw53\_32\bin"





#### Run

- Select "Run"
- Deployment

Meth	nod: Deple	Deploy to Remote Linux Host (should be defult)					
Files	to deploy:						
	Local File Path	location of the local file(s)	(auto-populated)				
	<b>Remote Directory</b>	location on the target	(auto-populated)				

N.B. The file information may not be populated until after a build is done

- Expand " Details" for "Upload files via SFTP"
- N.B. On rare occasions Qt Creator thinks the files have been deployed and will not re-send the files to the target; disabling this functionality avoids the situation.
  - Make sure neither box is selected
  - Set "Working directory:" under Run to the directory associated with the "Executable on device:"
  - Enter "/home/demo7in" in the box

💷 gh7inde	mo - Qt Creator		- 1	
<u>F</u> ile <u>E</u> dit	<u>B</u> uild <u>D</u> ebug <u>A</u> nalyze <u>T</u> ools <u>W</u> indow <u>H</u> elp			
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Edit	Import Existing Build	Deployment           Method:         Deploy to Remote Linux Host <ul></ul>		
	Active Project	Files to deploy:		
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Help	↓ Qt-5.9.3-3Dxx		Details 🔺	J
	Run	noremental deployment     grore missing files		
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	Dependencies Clang Static Analyzer	Run configuration: gh7indemo (on Remote Device) 🔻 Add 🔻 Remove Rename		
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Debug		Alternate executable on device:	imand instead	
		Arguments:		
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	Cype to locate (Ctrl+K)     I Issues	10 2 Search Results 3 Application Output 4 Compile Output 5 Debugger Console 6 General Messages 8 Test Results 🗢		• 🗆 //


• **Save!** File  $\rightarrow$  Save All



• Build the image for the target



- Build Let Qt Creator decide what is out of date
- Rebuild Force Qt creator to re-compile everything
- Clean Remove all the existing artifacts generated by previous builds



• Select Build → Clean Project "gh7indemo"

The bottom ribbon of Qt Creator has various panes (views) that can be examined. Click on "4 Compile Output). Note: image is shown post click; so the results and actions of the clean are shown.



• Click on the paintbrush icon to clear the contents



• Next, select Build  $\rightarrow$  Build Project "gh7indemo"

The following illustrates the last few lines in "Compile Output"

Compile Output $  \downarrow_{\Box} \langle \rangle \equiv +  \wedge \equiv$
-D_REENTRANT -fPIC -DON_HARDWARE -DQT_QML_DEBUG -DQT_QUICK_LIB -DQT_WIDGETS_LIB -DQT_GUI_LIB -DQT_QML_LIB -
DQT_NETWORK_LIB -DQT_CORE_LIB -I\gh7indemo -II\gh7indemo -I\\targetSysroot\kernel-headers\include -I
\\targetSysroot\usr\include -I\\QtLibrarySrc\build\targetInstallDir\include -I\\QtLibrarySrc
\build\targetInstallDir\include\QtQuick -I\\QtLibrarySrc\build\targetInstallDir\include\QtWidgets -I\
\\QtLibrarySrc\build\targetInstallDir\include\QtGui -I\\QtLibrarySrc\build\targetInstallDir\include
\QtQml -I\\QtLibrarySrc\build\targetInstallDir\include\QtNetwork -I\\QtLibrarySrc\build
\targetInstallDir\include\QtCore -III/include -I/usr/include -I\\QtLibrarySrc\build\targetInstallDir
\mkspecs\devices\linux-imx6-g++ -o moc_joystick.obj moc_joystick.cpp
C:\Qt\QtLibrarySrc\build4\\\QtSupport\gcc-linaro-2013\bin\arm-linux-gnueabi-g++ -Wl,-rpath=/usr/lib -Wl,-
rpath=/lib -mfloat-abi=softfp -Wl,-rpath,/usr/local/Qt-5.9.3/lib -o gh7indemo gh7indemo.obj ghwrapper.obj
lighting.obj climatecontrol.obj camera_scrn.obj menu.obj settings.obj gauges.obj radio.obj joystick.obj
qrc_samegame.obj moc_ghwrapper.obj moc_lighting.obj moc_climatecontrol.obj moc_camera_scrn.obj moc_menu.obj
<pre>moc_settings.obj moc_gauges.obj moc_radio.obj moc_joystick.obj -L/lib -L/usr/lib -LC:\Qt\QtSupport</pre>
\targetSysroot/usr/lib -lghdrv -lrt -lghio -LC:/Qt/QtLibrarySrc/build/targetInstallDir/lib -lQtSQuick -LC:\Qt
\QtSupport\targetSysroot/lib -lQt5Widgets -lQt5Gui -lQt5Qml -lQt5Network -lQt5Core -lGLESv2 -lEGL -lGAL -lpthread
13:59:25: The process "C:\Qt\Tools\mingw530_32\bin\mingw32-make.exe" exited normally.
13:59:25: Elapsed time: 00:59.
1 Issues 2 Search Results 3 Application Output 4 Compile Output 5 Debugger Console 6 General Messages 8 Test Results 💠 🔺 🔳

Note: When there are errors, they are also highlighted/summarized in the "Issues" tab.

Deployment (running the compiled image on the target) can also be accomplished multiple ways

🕎 gh7indemo - Qt Creator		×
<u>File Edit Build Debug Analyze Tools </u>	<u>M</u> indow <u>H</u> elp	
Projects 🔻 🕇 🕀 🗄+ 🖃	< <no document=""></no>	8+
▷ 腸 gh7indemo Welcome	Open a document	
	• File > Open File or Project (Ctrl+O)	
Edit	• File > Recent Files	
Design Debug Debug	<ul> <li>Tools &gt; Locate (Ctrl+K) and         <ul> <li>type to open file from any open project</li> <li>type c<space><pattern> to jump to a class definition</pattern></space></li> <li>type m<space><pattern> to jump to a function definition</pattern></space></li> <li>type f<space><filename> to open file from file system</filename></space></li> <li>select one of the other filters for jumping to a location</li> </ul> </li> </ul>	
Duriante	• Drag and drop nes nere	
<b>?</b>	Comple Output < > +	
Help	14:04:07: Uploading file "C:\Qt\QtSupport\GrayhillExamples\gh7indemo\images\NHZ_radio.png"	
gh7ndemo Qpen Documents ▼ B+ □ Debug	<pre>14:04:08: Uploading file "C:\Qt\QtSupport\GrayhillExamples\gh7indemo\images\Dpen+PipetSymphony.mp3" 14:04:08: Uploading file "C:\Qt\QtSupport\GrayhillExamples\gh7indemo\images\powerButton.png" 14:04:08: Uploading file "C:\Qt\QtSupport\GrayhillExamples\gh7indemo\images\RedRabbitSAt78.png" 14:04:08: Uploading file "C:\Qt\QtSupport\GrayhillExamples\gh7indemo\images\RedRabbitShot84x78.png" 14:04:08: Uploading file "C:\Qt\QtSupport\GrayhillExamples\gh7indemo\images\RedRabbitShot84x78.png" 14:04:08: Uploading file "C:\Qt\QtSupport\GrayhillExamples\gh7indemo\images\target467x467.png" 14:04:08: Uploading file "C:\Qt\QtSupport\GrayhillExamples\gh7indemo\images\target467x467.png" 14:04:08: Uploading file "C:\Qt\QtSupport\GrayhillExamples\build-gh7indemo-Qt_5_9_3_3Dxx-Debug \gh7indemo"</pre>	
	14:04:09: All files successfully deployed. 14:04:09: Deploy step finished. 14:04:09: Elapsed time: 00:05.	4 III
Type to locate (Ctrl+K)	1 Issues 2 Search Results 3 Application Output 4 Compile Output 5 Debugger Console 8 Test Results 🗢 🔺 🔲	

• Using the green triangle on the left hand side



• From the Build menu



• Keyboard short-cut (see Run above - <Ctrl-r>)



Switch (by selecting) to the "Application Output" tab; this is where qDebug messages are output.

Click the red square to terminate the target session.



## **Quick Reference**

📑 Qt Creato	r				
<u>F</u> ile <u>E</u> dit	<u>B</u> uild <u>D</u> ebug <u>A</u> nalyze <u>T</u> ools <u>W</u> indow <u>H</u> el	р			
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Debug			Build Steps		
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Help	🖵 Qt-5.9.3-3Dxx		Additional arguments		
	Build		Additional alguments.		
	Run		Generate separate debug into:		
	-		Enable QML debugging and profiling:	Might make your application vulnerable. Only use in a safe environment.	
	Project Settings		Enable Qt Quick Compiler:	A This Qt Version does not contain Qt Quick Compiler.	
	Editor		Effective qmake call:	qmake.exe C:\Qt\QtSupport\GrayhillExamples\gh10indemo\gh10indemo.pro -spec devices\linux-imx6-g++ "C	CONFIG
	Code Style			<pre>+=debug CONFIG+=qmi_debug nw_present=3D2104 &amp;&amp; C?/Qt/100is/mingw350_32/bin/mingw324make.e qmake_all</pre>	xe
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	Clang Static Analyzer				
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- Build Steps qmake
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- Clean Steps • Make

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- Override make  $\rightarrow$  C:\Qt\Tools\mingw530\_32\bin\mingw32-make.exe
- Build Environment Path
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• Deployment Upload files via SFTP unselect Ignore missing files

unselect Incremental deployment

- Run
  - Working directory /home/<path to executable image on display>

•



# Appendix C: Debugging

Let's face it; code never initially does what it is *supposed* to do; but rather what it was **told** to do! Luckily Qt Creator has a built-in debugger.

- First set a breakpoint Load gh7indemo Select the "Edit" view
  - Expand contents of gh7indemo





• Close the current open pane (screen shot illustrates "General Messages")



• Expand the "Sources" folder under the project file list





• Select the desired file; under "Sources" select "lighting.cpp" by double clicking





The file being displayed (edited) is shown in the "Open Documents" section as well as on the top of the editor pane. Additional open files can be selected by either selecting them from "Open Documents" or the up/down triangular arrows to the right of the file name. Also, the X to their right will close the file.

Select the line of code to set the breakpoint. N.B. The editor is not context aware; so it is possible to set a breakpoint on a commented out line.

- Scroll down to line 98 ("void dtlighting::handleLightDimmer (int level)")
- Left click on the mouse to the left of the line number; a red circle will appear



- Notice the scroll bar gutter indicates the relative location of the breakpoint in the file.
- Save



• Click on the green arrow like "Run" from above; but with the homely lady bug.

N.B. This may cause the project to be re-compiled if the initial build was not configured for debug.



The code begins execution and quickly hits the breakpoint.

Note that the display has not been updated yet. The method (handleLightDimmer) is invoked during the class creation – line 42 handleLightDimmer(5);.

Lastly, note the breakpoint is actually at line 101; the first executable statement within the function/method.





• The debugger pane illustrates the calling tree

Debugger 🔹 🕨 🙀 🖓	🖃 Threads: #1	<b>~</b>
Level Function	File	Line
<ul> <li>dtlighting::handleLightDimmer(int)</li> <li>dtlighting::dtlighting(QWidget *)</li> <li>GHwrapper::GHwrapper(QStackedWidget *)</li> <li>main</li> </ul>	lighting.cpp lighting.cpp ghwrapper.cpp gh7indemo.cpp	101 42 257 38

- Clicking on line 2 jumps to the aforementioned caller
- Debugger stepping option menu



The debugger features the usual (Mouse over the icons for a description)

- Step Over <F10>
- $\circ$  Step In  $\langle F11 \rangle$
- $\circ \quad \text{Step Out} \quad \quad <\text{Shift}>+<\text{F11}>$



# Appendix D: Build and Run 3Dxx Desktop Application

- Select "Projects"
- Select "Build" under "Desktop Qt 5.9.3 MinGw 32bit"

The following steps facilitate the copying of the necessary image files into the desktop simulation folder.

• Click "Add Build Step" → "Custom Process Step"

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Debug Projects	Build & Run Desktop Qt 5.9.3 MinGW 32bit	Build Steps qmake: qmake.exe gh7ndemo.pro -spec win32-g++ "CONFIG+=debug" "CONFIG+=qml_debug"	Details 🔻
<b>P</b> Help	<ul> <li>Run</li> <li>Qt-5.9.3-3Dxx</li> <li>→ Build</li> </ul>	Make: mingw32-make.exe in C:\Qt\QtSupport\GrayhilExamples\build-gh7indemo-Desktop_Qt_5_9_3_MinGW_32bit-Debug Add Build Step  Custom Process Step	Details 🔻
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Debug	Code Style Dependencies Clang Static Analyzer	Build Environment	Details 💌
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- Command C:\QtGhSupport\GrayhillExamples\copyImages.bat
- Arguments <project> e.g. gh7indemo

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• File  $\rightarrow$  Save All



• Select "Rebuild Project "gh7indemo" from the "Build" menu

N.B. It may take a few seconds to refresh the menu options.



Click on the "Compile Output" and "Issues" selectors on the bottom of the Qt Creator window to check for error messages and problems.

The desktop version can now be run by clicking on the big green "Run" arrow on the lower left corner of the Qt Creator window.

Click on the "Application Output" item on the bottom row to view application output.

Click on red square on "Application Output" window to stop application.



# Appendix E: Build and Run QML Demonstration Program

The following steps illustrate how to build and run the QML demonstration program "Samegame".

- From Qt Creator open the "samegame" project. (Select "Welcome" to go to home screen)
- Select desired kit
- Update "Additional arguments": under "Build Steps" "Details" to reflect the proper hardware
- Select "Build->Rebuild All" to build program
- Click on the green arrow "Run" button to run program



#### **Appendix F:** Setting up a 3Dxx Qt Program to Run at Boot Up

This section describes how to configure a program to automatically execute at boot up.

- Open a terminal window on the target (Error! Reference source not found. describes how to launch "PuTTY")
- Create a launch script for the desired application
  - o cd /etc/init.d
  - echo "#! /bin/sh –l
  - o cd /home/demo7in
  - /home/demo7in/gh7indemo &" > launchQtApp *spawn application process*
  - cat launchQtApp
  - chmod 755 launchQtApp

#### Explanation

set into proper directory treat as login (runs profile) set directory for images verify contents make script executable



- Create a link to the launch script created above
  - $\circ$  cd /etc/rc.d

#! /bin/sh -l

- ln -s /etc/init.d/launchQtApp S12qtApp
- $\circ$  ls –l S12qtApp

set into proper directory create soft link to executable file verify link creation



Note: Do not try to launch multiple Qt applications at boot up or try to launch the ghvehicleapp application along with a Ot application as they will conflict with one another.



**Note**: When switching from running one application to another, even between Qt applications, it is a good idea to do a reboot of the 3Dxx Display in between to make sure that the hardware is properly reset. This can be done by entering the "reboot" command on the 3Dxx Display Linux console.

# Appendix G: Interfacing 3Dxx Hardware from QT Software

The 3Dxx Display contains the following custom component interfaces:

- LCD
- LCD Backlight
- Camera driver
- CAN driver
- Digital I/O driver
- Analog Input driver (Model 3D70 only)
- Buzzer (Models 3D70, 3D2104)
- Audio Output (Model 3D70 only)

This section explains how to access the functionality of these components. The programming interfaces and provided API functions are covered, with the syntax and parameters defined. Sample code is also provided where appropriate.

## LCD

The Grayhill 3Dxx Series Display uses a 16 bit per pixel LCD screen. The pixel dimensions of various 3Dxx Display products are shown in the section Supported Hardware Products. The default orientation of the frame buffer is landscape mode (wider pixel dimension is in horizontal direction).

# LCD Backlight

The LCD Backlight setting is a value between 0 (minimum) and 100 (maximum) inclusive. The brightness value can be set in the file /sys/class/backlight/pwm-backlight.0/brightness

## Sample Code:

```
int value = 80;
QFile file("/sys/class/backlight/pwm-backlight.0/brightness");
if (file.open(QIODevice::WriteOnly | QIODevice::Text))
{
        QTextStream out(&file);
        out << value;
        file.close();
}
```



# **Camera Driver Interface**

The Grayhill 3Dxx Display device can contain multiple camera inputs. NTSC and PAL format video inputs are supported by modifying the camera input sensor parameters. The camera output can be displayed on the LCD. The following camera display parameters can be modified:

- Window parameters window size and window position
- Color parameters brightness, contrast, saturation and hue
- Rotation
- Input sensor parameters provides support for NTSC and PAL formats
- Camera output to LCD foreground or background with color key

Camera output is displayed at 30fps. **Note:** Only one camera input can be active at a time.

### Interface:

The Qt application can interface with the Camera driver using the Camera class.

#### Data Types:

```
typedef struct SENSORPARAMS // Must be set according to camera input
type
                            // NTSC
                                        PAL
{
    unsigned int top;
                            // 4
                                        5
    unsigned int left;
                            // 0
                                        4
    unsigned int height;
                            // 480
                                        567
    unsigned int width;
                            // 640
                                        640
} SENSORPARAMS, *PSENSORPARAMS;
#define FOREGROUND
                    (1)
#define BACKGROUND
                    (0)
// These are the only allowed values for VIDEO COLOR KEY xxx:
#define VIDEO COLOR KEY BLACK
                                 (0x0000000)
#define VIDEO COLOR KEY RED
                                 (0x00FF0000)
#define VIDEO COLOR KEY GREEN
                                 (0x0000FF00)
#define VIDEO COLOR KEY BLUE
                                 (0x00000FF)
#define VIDEO COLOR KEY YELLOW
                                 (0 \times 00 FFFF00)
#define VIDEO COLOR KEY CYAN
                                 (0x0000FFFF)
#define VIDEO COLOR KEY MAGENTA (0x00FF00FF)
#define VIDEO COLOR KEY WHITE
                                 (OxOOFFFFFF)
typedef struct DISPLAYPARAMS
{
    unsigned int top; // top left window y-coordinate
    unsigned int left;
                         // top left window x-coordinate
                         // (must be divisible by 4)
```



The camera output always operates in native landscape mode. Use the following rotation values to support other display and camera orientations:

Value	Rotation				
0	No rotation				
1	Vertical flip				
2	Horizontal flip				
3	180				
4	90 right				
5	90 right with vertical flip				
6	90 right with horizontal flip				
7	90 left				
#define HU #define HU #define HU typedef	JE_CODE_00 (0x00) JE_CODE_7F (0x7F) JE_CODE_80 (0x80) Struct _COLORPARAMS				
{ unsi unsi HUE_CODE unsi } COLORP	_ gned int brightness; gned int saturation; gned int hue; _80 gned int contrast; ARAMS, *PCOLORPARAMS;	     	0-255 0-255 HUE_CODE_00, 0-255	HUE_CODE_7F,	or

#### **Function Prototypes:**

### Camera::Camera

Camera class constructor

## Syntax

Camera:: Camera (int camnum, int fbdev = FB\_DEV\_0);

#### Parameters

int camnum

[in]

Camera Number. Valid range 1-2 for Model 3D50, 1-3 for Model 3D70, 1-4 for Model 3D2104

#define FB\_DEV\_0 (0) // GRAPHICS being sent to /dev/fb0
#define FB\_DEV\_1 (1) // GRAPHICS being sent to /dev/fb1
int fbdev
[in]
The "fbdev" value must indicate whether the GRAPHICS are being sent to
fb0 or fb1. When GRAPHICS are being sent to fb0, then video will be sent to
fb1 and only foreground mode is allowed. This is the default assumed if
"fbdev" is missing.
If GRAPHICS are being sent to fb1, then video will be sent to fb0 and both
foreground and background modes are supported. In order to send GRAPHICS to
fb1, add this parameter to the command line that launches Qt: -display LinuxFb:/dev/fb1

#### **Return Value**

none

#### Camera::setdisplayparams

Sets the following display window parameters

- origin
- window size
- rotation
- foreground or background with color key (When using background mode the camera video only shows through where the graphics data is set to the color that matches the specified color key. Graphics of any other color will appear on top of the camera video image.)

#### Syntax

```
int Camera::setdisplayparams(PDISPLAYPARAMS p);
```

## Parameters

PDISPLAYPARAMS	р
	[in]
	refer to DISPLAYPARAMS structure

### **Return Value**

int 0 indicates success, -1 indicates failure

## Camera::setcolorparams

Sets the following camera color parameters

• Brightness



- Saturation
- Contrast
- Hue

#### Syntax

int Camera::setcolorparams(PCOLORPARAMS p);

### Parameters

PCOLORPARAMS p [in]

p [in] refer to COLORPARAMS structure

#### **Return Value**

int 0 indicates success, -1 indicates failure

#### Camera::setsensorparams

Sets the camera sensor parameters

### Syntax

int Camera::setsensorparams(PSENSORPARAMS psensor);

### Parameters

PSENSORPARAMS psensor [in] refer to SENSORPARAMS structure

#### **Return Value**

int always returns 0

**Camera::show** Enables or disables the camera

## Syntax

int

int Camera::show(int enable);

## Parameters

enable [in] 1 = enable, 0 = disable

### Return Value

int 0 indicates success, -1 indicates failure



## **Required Files:**

Header File: camera.h Link Library : libghdrv.so

## Sample Code:

```
#include "camera.h"
COLORPARAMS color;
DISPLAYPARAMS disp;
int cameranum = 1; // camera input 1
Camera cam(cameranum);
disp.top = 0;
disp.left
          = 80;
disp.height = 480;
disp.width = 640;
disp.rotate = 4; // rotate 90 degree right
        = FOREGROUND;
disp.fq
// configure display parameters
cam.setdisplayparams(&disp);
// start camera
cam.show(1);
// change color parameters
color.brightness = 50;
color.saturation = 128;
color.contrast = 128;
color.hue = 0;
// configure color parameters
cam.setcolorparams(&color);
. . . .
// stop l+camera
cam.show(0);
```

## **CAN Driver Interface**

The 3D50 and 3D70 Displays includes two CAN controller modules. Available CAN ports are CAN1 and CAN2. The 3D2104 Display includes three CAN controller modules. Available CAN ports are CAN1, CAN2, and CAN3. The CAN controller supports both standard and extended frames.



### Interface:

The Qt demo application can interface with the CAN bus driver using the CAN class.

### Data Types:

```
/* special flag bits for the CAN_ID */
#define CAN_EFF_FLAG 0x80000000 /* EFF flag (add to ID to activate 29-bit ID) */
#define CAN_RTR_FLAG 0x40000000 /* remote transmission request */
#define CAN_ERR_FLAG 0x20000000 /* error frame */
struct _CANMSG
{
    unsigned int ID;
    unsigned int Length; // Data Length Code of the Msg (0..8)
    unsigned char Data[8];
};
typedef struct CANMSG CANMSG, *PCANMSG;
```

#### **Function Prototypes:**

## CAN::CAN

CAN class constructor

#### Syntax

CAN::CAN(int num);

#### Parameters

num [in] CAN Port Number. Valid range 1-2 for Models 3D50, 3D70; 1-3 for Model 3D2104

#### **Return Value**

none

int

## CAN::OpenPort

Opens the CAN socket

#### Syntax

int CAN::OpenPort(void);

#### Parameters

none

**Return Value** 



int non-zero value indicates success, -1 indicates failure

## **CAN::WritePort**

Writes a single CAN frame to the CAN port.

#### Syntax

int CAN::WritePort(PCANMSG TxMsg);

#### Parameters

PCANMSG TxMsg [in] Contains the CAN frame to be written

#### **Return Value**

int 0 indicates success, -1 indicates failure

#### **CAN::ReadPort**

Attempts to read a single CAN frame from the CAN port. Note that the CAN socket is configured to be non-blocking, so calls to ReadPort will return even if there is no data.

#### Syntax

int CAN::ReadPort(PCANMSG RxMsg);

#### Parameters

PCANMSG RxMsg [out] Contains the CAN frame received

#### **Return Value**

int contains the number of bytes read, -1 indicates failure

## CAN::ClosePort

Closes the CAN socket

#### Syntax

void CAN::ClosePort(void);

# Parameters

none

Return Value none



### **Required Files:**

Header File: can.h Link Library : libghdrv.so

## Sample Code:

```
#include ``can.h"
CANMSG TxMsg;
CANMSG RxMsg;
int bytesread = 0;
int cannum = 1; // CAN1
/* Init TX and RX message */
TxMsg.ID = 0x23;
TxMsq.Length = 8;
for (int i=0; i<8; i++)
     TxMsg.Data[i] = (0x11 * (i+1)); // fill random data
memset((void *)&RxMsg, 0, sizeof(CANMSG));
// CAN1
CAN can(cannum);
can.OpenPort();
can.WritePort(&TxMsg);
do
{
     bytesread = can.ReadPort(&RxMsg);
     // add delay
} while (bytesread != sizeof(CANMSG));
can.ClosePort();
```



# Digital I/O Driver Interface

The Model 3D50 Display, Model 3D70 Display, and Model 3D2104 Display each have four digital inputs and four digital outputs, but they are configured differently and these differences will be explained. Each device uses the same library calls to read the digital inputs and set the digital outputs.

On the 3D50 Five Inch Display Pin 4 on its connector is a dedicated input only pin. Pin 5 is a dedicated output only pin. Pins 6, 7, and 8 are shared I/O pins that can be used to output a signal or input a signal.

On the Model 3D70 Seven Inch Display each of the four inputs are dedicated and so operate independently of any output pins.

On the Model 3D2104 10.4 Inch Display all digital output pins are shared I/O pins that can be used to output a signal or input a signal.

For a shared I/O pin to function as an input, the corresponding output must be set low.

Model 3D50 Pins	Model 3D70 Pins	Model 3D2104 Pins
Input 1 (Pin 4)	Input 1 (Pin 4 Connector A)	Input 1 or Output 1 (Pin 10)
Input 2 or Output 2 (Pin 6)	Input 2 (Pin 8 Connector B)	Input 2 or Output 2 (Pin 21)
Input 3 or Output 3 (Pin 7)	Input 3 (Pin 9 Connector B)	Input 3 or Output 3 (Pin 32)
Input 4 or Output 4 (Pin 8)	Input 4 (Pin 10 Connector B)	Input 4 or Output 4 (Pin 9)
Output 1 (Pin 5)	Output 1 (Pin11 Connector B)	
	Output 2 (Pin12 Connector B)	
	Output 3 (Pin13 Connector B)	
	Output 4 (Pin14 Connector B)	

The following table summarizes all of the digital I/O pins for each model:

## Interface:

A Qt application may set or get the digital I/O pin states by calling the appropriate C library function as described below.

```
#define GHIOLIB CH1
                         (0x01)
#define GHIOLIB CH2
                         (0x02)
#define GHIOLIB CH3
                         (0x03)
#define GHIOLIB CH4
                         (0x04)
#define GHIOLIB MAX DIGITAL IO (4)
#define GHIOLIB DIG IN FLOAT
                                (0)
#define GHIOLIB DIG IN PULL DN (1)
#define GHIOLIB DIG IN PULL UP (2)
#define GHIOLIB RET OK
                               0
#define GHIOLIB RET ERROR
                               1
#define GHIOLIB RET NOTSUPPORTED 2
```

## ghiolib\_setDigIncfg (Model 3D70 only)



Sets input pin pull-up/pull-down configuration.

### Syntax

int ghiolib setDigIncfg(int ch, uint8 t config);

### Parameters

int ch

[in]

Input pin to configure (GHIOLIB\_CH1, GHIOLIB\_CH2, GHIOLIB\_CH3, or GHIOLIB\_CH4) uint8\_t config

#### [in]

GHIOLIB\_DIG\_IN\_FLOAT, GHIOLIB\_DIG\_IN\_PULL\_DN, or GHIOLIB\_DIG\_IN\_PULL\_UP

#### **Return Value**

```
int
GHIOLIB RET OK, GHIOLIB RET ERROR, Or GHIOLIB RET NOTSUPPORTED
```

### ghiolib\_getDigIn

This function reads the state of an input pin.

#### Syntax

int ghiolib getDigIn(int ch, uint8 t \*value);

#### Parameters

int ch
 [in]
 Input pin to read (GHIOLIB\_CH1, GHIOLIB\_CH2, GHIOLIB\_CH3, or GHIOLIB\_CH4)
uint8\_t \*value
 [out]
 Returns 0 if input is low, else returns 1

#### **Return Value**

int GHIOLIB\_RET\_OK, GHIOLIB\_RET\_ERROR, or GHIOLIB\_RET\_NOTSUPPORTED

## ghiolib\_getDigOut

Reads the current state of an output pin.

#### Syntax

int ghiolib\_getDigOut(int ch, uint8\_t \*value);

#### Parameters

```
int ch
    [in]
    Output pin to read (GHIOLIB_CH1, GHIOLIB_CH2, GHIOLIB_CH3, or GHIOLIB_CH4)
uint8_t *value
    [out]
```



Returns 0 if output is set low, else returns 1

#### **Return Value**

int GHIOLIB\_RET\_OK, GHIOLIB\_RET\_ERROR, or GHIOLIB\_RET\_NOTSUPPORTED

#### ghiolib\_setDigOut

This function sets the current state of an output pin.

#### Syntax

int ghiolib setDigOut(int ch, uint8 t value);

#### Parameters

```
int ch
    [in]
    Output pin to set (GHIOLIB_CH1, GHIOLIB_CH2, GHIOLIB_CH3, or GHIOLIB_CH4)
uint8_t value
    [in]
    If 0 sets output pin low, else sets output pin high (Vbatt)
```

#### **Return Value**

```
int GHIOLIB_RET_OK, GHIOLIB_RET_ERROR, or GHIOLIB_RET_NOTSUPPORTED
```

#### **Required Files:**

Header File: ghiolib.h Link Library: libghiodrv.so

#### Sample Qt Code:

```
#include <QDebug>
```

```
// For access to ghiolib
typedef u_int16_t uint16_t;
typedef u_int8_t uint8_t;
#ifdef __cplusplus
extern "C" {
#endif
#include "ghiolib.h"
#ifdef __cplusplus
}
#endif
int channel;
uint8_t digValue;
int gpioOutput;
```



```
int
        qpioInput;
int
        gpioStatus;
// Set inputs to pull down mode and read current inputs and outputs for each channel
qpioOutput = 0;
gpioInput = 0;
for (channel = 0; channel < GHIOLIB MAX DIGITAL IO; channel++)
{
    // Set input to pull down mode
    gpioStatus = ghiolib setDigIncfg(channel + 1, GHIOLIB DIG IN PULL DN);
    if ((GHIOLIB RET OK != gpioStatus) && (GHIOLIB RET NOTSUPPORTED != gpioStatus))
    {
        qDebug("ERROR (%d) doing ghiolib setDigIncfg on channel: %d\n",
               gpioStatus, channel + 1);
    }
    // Read current output setting
    digValue = 0;
    gpioStatus = ghiolib getDigOut(channel + 1, &digValue);
    if (GHIOLIB RET OK != gpioStatus)
    {
        qDebug("ERROR (%d) doing ghiolib getDigOut on channel: %d\n",
               gpioStatus, channel + 1);
    }
    else
    {
        if (1 == digValue)
        {
            gpioOutput |= (1 << channel);</pre>
        }
    }
    // Read current input
    digValue = 0;
    gpioStatus = ghiolib getDigIn(channel + 1, &digValue);
    if (GHIOLIB RET OK != gpioStatus)
    {
        qDebug("ERROR (%d) doing ghiolib getDigIn on channel: %d\n",
               gpioStatus, channel + 1);
    }
    else
    {
        if (1 == digValue)
        {
            gpioInput |= (1 << channel);</pre>
        }
    }
}
qDebug("GPIO initial output: 0x%x input: 0x%x\n", gpioOutput, gpioInput);
```



# Analog Inputs (Model 3D70 only)

The Model 3D70 Display has two analog inputs. Analog Input 1 is connected to Pin 4 on Connector B and Analog Input 2 is connected to Pin 5 on Connector B. The Analog Inputs can be used to read resistance, voltage, or current with respect to the analog return pin (pin 7 on Connector B).

### Interface:

A Qt application may configure or read an analog input pin by calling the appropriate C library function as described below.

```
#define GHIOLIB CH1
                         (0x01)
#define GHIOLIB CH2
                         (0x02)
#define GHIOLIB MAX ANALOG IN (2)
#define GHIOLIB ANALOG 5V
                                (0)
#define GHIOLIB ANALOG 15000HM (1)
#define GHIOLIB ANALOG 10V
                                (2)
#define GHIOLIB ANALOG 50000HM (3)
#define GHIOLIB ANALOG 20MA
                                (4)
#define GHIOLIB RET OK
                               0
#define GHIOLIB RET ERROR
                               1
#define GHIOLIB RET NOTSUPPORTED 2
typedef struct ADCVALUES
{
      uint16 t adcch;
      uint16 t adcvref;
      uint16 t adcstatus;
      uint16_t adcconfig;
} ADCVALUES, *PADCVALUES;
```

## ghiolib\_setADCcfg (Model 3D70 only)

This function configures an analog input for one of five different reading modes.

#### Syntax

```
int ghiolib setADCcfg(int ch, uint8 t config);
```

#### Parameters

int ch

[in]

Input to configure (GHIOLIB\_CH1 or GHIOLIB\_CH2)

### uint8\_t config

[in]

GHIOLIB\_ANALOG\_5V, GHIOLIB\_ANALOG\_10V, GHIOLIB\_ANALOG\_15000HM, GHIOLIB\_ANALOG\_50000HM, or GHIOLIB\_ANALOG\_20MA

#### **Return Value**

int

GHIOLIB\_RET\_OK, GHIOLIB\_RET\_ERROR, or GHIOLIB\_RET\_NOTSUPPORTED



### ghiolib\_getADCIn (Model 3D70 only)

This function gets a reading from an analog input pin.

#### Syntax

int ghiolib getADCin(int ch, PADCVALUES p);

#### Parameters

int ch [in] Input to read (GHIOLIB\_CH1 or GHIOLIB\_CH2) PADCVALUES p

[out]

Reading is returned in member "adcch" of this structure. Other items in this structure can be ignored.

#### **Return Value**

int GHIOLIB\_RET\_OK, GHIOLIB\_RET\_ERROR, or GHIOLIB\_RET\_NOTSUPPORTED

#### **Required Files:**

Header File: ghiolib.h Link Library: libghiodrv.so

## Sample Qt Code:

```
#include <QDebug>
```

```
// For access to ghiolib
typedef u_int16_t uint16_t;
typedef u_int8_t uint8_t;
#ifdef __cplusplus
extern "C" {
#endif
#include "ghiolib.h"
```

#ifdef cplusplus

} #endif

```
int channel = 0;
ADCVALUES analogData;
int gpioStatus;
```

```
// Set analog input 1 to read 0 to 10 volts
gpioStatus = ghiolib setADCcfg(channel + 1, GHIOLIB ANALOG 10V);
```



```
if (GHIOLIB_RET_OK != gpioStatus)
{
    qDebug("ERROR (%d) doing ghiolib_setADCcfg on channel: %d\n",
        gpioStatus, channel + 1);
}
// Get current reading
gpioStatus = ghiolib_getADCin(channel + 1, &analogData);
if (GHIOLIB_RET_OK != gpioStatus)
{
    qDebug("ERROR (%d) doing ghiolib_getDigOut on channel: %d\n",
        gpioStatus, channel + 1);
}
gDebug("Reading from channel %d is %d millivolts\n", channel + 1, analogData.adcch);
```

# Buzzer (Models 3D70, 3D2104)

The Model 3D70 and 3D2104 Displays have an internal buzzer that can be sounded on command.

## Interface:

A Qt application can turn the internal buzzer on or off by sending the proper number to the buzzer control file.

### **Required Files:**

Header File: none Link Library: none

## Sample Qt Code:

```
#include <QString>
#include <QDebug>
OFile
             buzzerFile;
bool
             buzzerFileOpen;
buzzerFile.setFileName("/sys/class/backlight/pwm-
backlight.3/brightness");
buzzerFileOpen = buzzerFile.open(QIODevice::WriteOnly |
QIODevice::Text);
if (false == buzzerFileOpen)
{
   qDebug("Error opening buzzer file\n");
}
// To turn buzzer ON
if (true == buzzerFileOpen)
{
   QTextStream buzzerOut (&buzzerFile);
```

```
buzzerOut << 10;
}
// . . .
// To turn buzzer OFF
if (true == buzzerFileOpen)
{
    QTextStream buzzerOut(&buzzerFile);
    buzzerOut << 0;
}</pre>
```

# Audio Output (Model 3D70 only)

The Model 3D70 Display has the ability to play an mp3 audio file and send the audio output to a monaural line out (pins 1, AUDIO OUT, and 2, AUDIO RET, on the B connector).

## Interface:

A Qt application can start playing an mp3 audio file and can stop the playing of the audio file using a Linux utility called mpg123.

## **Required Files:**

Header File: none Link Library: none Executable: mpg123 (normally installed on Model 3D70 Display)

## Sample Qt Code:

```
// To play mp3 file "sounds.mp3"
// Note that by placing mp3 file in "images" folder, Qt will automatically
// download the mp3 file to the target with the other image files being used.
// Command shown to play mp3 file will first stop playing any mp3 file
// that may already be playing.
system("test `pidof mpg123` && kill `pidof mpg123` ;"
        "mpg123 -q images/sounds.mp3 &");
// To stop playing mp3 file (if any)
system("test `pidof mpg123` && kill `pidof mpg123`");
```



# Appendix H: Setting 3Dxx Flash File System R/W Mode

- To immediately set the 3Dxx Display file system to read-write mode enter this console command:
   mount –o remount,rw /
- The above command only remains in effect until the next reboot and is usually stored in a script file here: /home/writeablefs.
- To have the 3Dxx Display file system set to read-write mode on boot-up, edit the file /etc/init.d/rconce and add the above command to the end of this file just before the final "exit" command like this:

- To leave the 3Dxx Display file system set to read-only mode on boot-up, edit the file /etc/init.d/rconce and remove the "mount –o remout,rw /" line near the end of the file (or comment it out by putting a "#" in column one of that line)
- Another way to have the 3Dxx Display file system set to read-write mode on boot-up, is to add a link to the "writeablefs" script in the home directory like this:

## • ln –s /home/writeablefs /etc/rc.d/S03writeablefs

The 3Dxx configuration script utilizes this technique to configure the 3Dxx Display file system to be in read-write mode to make Qt development more convenient.

....



# Appendix I: Building Qt Library Source

Note: This appendix is included for reference and is not a required step.

This section describes the procedure to download and build the Qt 5.9.3 library code. The library source code can be downloaded from Grayhill at: http://www.grayhill.com/qt43d.

Please reference http://doc.qt.io/qt-5/windows-requirements.html for additional information.

This procedure relies on both Qt Creator and the Grayhill support files having been previously downloaded and installed.

- Download "Qt 5.9.3 Library Source" from the Grayhill website
- Open the download folder and double click on "QtLibrarySrc.exe"

A User Access Control window may pop-up

- Click "Yes" to allow the self-extracting zip file to proceed
- The following window appears



• Click "Yes"




• Using Windows Explorer; navigate to "C: Qt\QtLibrary\Src" and verify the folder was installed

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• Double click on "termWithPath.bat" – this launches a cmd window with the properly configured path





- mkdir build
- cd build
- mkLibs

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Using C:\QtGhSupport; if not correct please update the script's variables and re-ru	un			•
PATH: C:\Qt\Tools\mingw530_32\bin;C:\QtGh5upport\gcc-linaro-2013\bin;C:\QtGh5upport QtGh5upport\Python27;C:\QtGh5upport\Perl64\bin;C:\Qt\QtLibrarySrc;	t\debu	igger;C	:\	
To build: 1) cd (create (mkdir) if necessary) to the desired build folder (e.g. mkdir build 2) mkLibs <optional (parallel="" compiling)="" j="" value=""> default is 4</optional>	d; cd	build)		
Microsoft Windows [Version 10.0.16299.251] (c) 2017 Microsoft Corporation. All rights reserved.				
C:\Qt\QtLibrarySrc>mkdir build				
C:\Qt\QtLibrarySrc>cd build				
C:\Qt\QtLibrarySrc\build>mkLibs_				

• The window title bar updates as the build progresses



rauhi

Qt Library build and installation completed! Start: 9:55:53.22 Finish:10:20:32.53

C:\Qt\QtLibrarySrc\build>



• Log files and a configuration summary are also created

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## Appendix J: Dynamic IP Address

Enter this command to find the 3Dxx Display Ethernet IP address:
 ifconfig eth0

The IP address of the 3Dxx Display is displayed after the tag "inet addr:" and is circled in red in the example output shown below.

- If the tag "inet addr:" is not present; enter these commands and try the "ifconfig eth0" command again
  - o ifdown eth0
  - o ifup eth0
- In this example the IP address is 192.168.40.118 Make a note of this IP address

## - 0 Putty COM1 - Putty ghiimx6 login: root login[675]: root login on 'ttymxc0' running /etc/profile.local Setting backlight to 100 root@ghiimx6:~ ifconfig eth0 Link encap: Ethernet HWaddr 00:10:25:0C:76:9D eth0 inet addr:192.168.40.118 Bcast:192.168.40.255 Mask:255.255.255.0 UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1 RX packets:207899 errors:0 dropped:0 overruns:0 frame:0 TX packets:4054 errors:0 dropped:0 overruns:0 carrier:0 collisions:0 txqueuelen:1000 RX bytes:48756330 (46.4 MiB) TX bytes:360850 (352.3 KiB) root@ghiimx6:~

Return



## Appendix K: Static IP Address

If using a **static** IP address for the display, once the address is determined:

- cp /etc/network/interfaces /etc/network/interfaces.bak
- vi /etc/network/interfaces
- replace

   iface eth0 inet dhcp
   udhcpc\_opts -t 5 -T 3 -A 20 -S &
- with iface eth0 inet static address **192.168.40.118** netmask 255.255.255.0

Google "linux interface file" for additional information.

<u>Return</u>