Toolbars

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Definition   Calibration   Console   Settings   Cell actions   Application API   Integration   Examples   Contact

A toolbar is an area on the touch screen that acts independently from the main calibrated video area, as shown below;

Touch screen covering video with a toolbar defined on top of the normal calibrated area

Touch screen covering video area and extended area to right with four toolbars defined

Toolbars are utilised in all manner of pointer device type applications. A toolbar is sub divided into cells of equal size which are arranged into a specified number of rows and columns. They can simply be used to mask off areas of the calibrated video area or they can be used to trigger an event. They are particularly useful if a pointer device has both a calibrated, mouse emulation area and a non-mouse emulation area handled by an external application. A toolbar event can be associated with a UPDD Toolbar function or application functions. The cursor does not move from its current position when a toolbar is touched.

Toolbars can be positioned anywhere on a touch screen as suits requirements. Toolbars that reside outside the main touch screen / video display area are normally referred to as the touch surround area. Toolbars that reside within the video display area can also have visual attributes applied to give tactile feedback (Windows only at time of writing) within the cell to cater for an on-screen visual reference.

Toolbars can be calibrated individually or defined such their position is relative to the main video calibration area.

Please note: All toolbar functionality is initially developed in our Windows driver as Windows is our main development and customer base. Not all driver functionality is automatically made available in other supported OS and this is particularly true of toolbar features. This document describes the full toolbar functionality available in under Windows. For other OS the toolbar functionality may be limited or even unavailable.

Toolbar Definition

Toolbars can be defined and configured in a number of ways:

- Newly created using the UPDD Console, toolbar dialog – Add a new toolbar option.
- Imported from previously saved toolbar definitions using the UPDD V4 UPDD Console, toolbar dialog – Export and Import Toolbar options.
- Pre-defined in the customer's production configuration files
- Created by external applications
- Manually defined in the UPDD Configuration files (normally used in embedded environments or where a UPDD Console program is not available for the target system)

The separate definition methods are described below:

UPDD Console, Toolbar option – New creation

The Toolbar dialog is used to define and configure toolbars. If the Toolbar option is not shown on the UPDD Console it can be enabled with the /tbr parameter when invoking the console:

Windows: dcu.exe /tbr
Mac OS X   5.x.x: Applications/Utilities/UPDD\ Console.app/Contents/MacOS/dcu /tbr

Choose "Add a new toolbar" to create toolbars as required.

Specify the name and initial attributes. When a toolbar is initially created it automatically invokes toolbar calibration to allow the user to define the initial placement and size of the toolbar. If the calibration is bypassed (hit ESC or timeout) the toolbar is positioned as defined in the placement fields (default is the top left hand corner of the desktop). The default attributes given to the toolbar are Highlight and Drag-able so that its position is seen and it can be dragged to the desired position.

UPDD Console, Toolbar option – Import toolbar

The Toolbar dialog is used to define and configure toolbars. Once defined the toolbars can be exported to a toolbar definition file to be imported at a later date.

Production Pre-defined

Toolbars are created in a target system and the toolbar definitions files are supplied to us for inclusion in our software production system such that they are specified in the configuration files delivered as part of the software.

Created by external applications using the UPDD API

Toolbar API calls are available to create, delete and calibrate toolbars as required.

Embedded configurations

For embedded systems, such as Windows CE and XPe, where all elements of the system are built remotely into an embedded image, the toolbars can are defined in the embedded configuration files. In this environment, UPDD is supplied in embedded component form with preset configuration files and normally the toolbars will be pre-defined in the configuration files.

If the toolbars *are not* pre-defined in the delivered UPDD configuration files or they need to be updated or others need to be added then they need to be created system using the UPDD Console and then extracted into the UPDD embedded configuration files as described below:

Win CE

Toolbars are supported in UPDD CE version 5.1.0 and above as documented here.

Windows Xpe

Create the toolbars as required using the toolbar dialog and utilize the tbupdd.ini file in subsequent XP embedded images.

Calibration

Once the toolbars are defined they can be calibrated in a number of ways:

- using UPDD Console, toolbar calibration option
- UPDD System Tray, Calibrate option (Windows only)
- via the Tbcalib program, by passing the appropriate parameter
- Defined relative to the main video calibration.

Calibrate via the Toolbar dialog

Select the [icon] Calibrate toolbar option on the UPDD Console toolbar dialog and follow the instructions to touch top left and bottom right corners of the toolbar. Touch the area of the screen where you need the toolbar to be located.

Touch the top left corner of the toolbar area on your touch-screen

Touch the bottom right corner of the toolbar area on your touch-screen

The above, default images, are used to request toolbar calibration touches. The toolbar may actually be outside the video area marked by some image under the touch screen. In some cases custom toolbar images may be utilised, as in the example below for a 6 celled toolbar to the right of the video image:

Customed toolbar calibration images are held as toolbar-0.png and toolbar-1.png.

Calibrate via Tbcalib program

Invoke Tbcalib to calibrate an individual toolbar or all toolbars

Tbcalib {Parameters}

The calibration program can accept a number of toolbar parameters, as follows:

Bundle={specify GUID} - only calibrate devices in a specific bundle
Device=n   - only calibrate the specified device and currently selected calibration mode.
Toolbar=whatever   - only calibrate toolbar whatever
TOOLBAR   - only calibrate toolbars

Please note parameters are case sensitive and must be defined as shown above.

And follow the instructions to touch top left and bottom right corners of the toolbar.

Calibrate via the UPDD system tray, calibrate option

The UPDD System Tray, Calibrate option lists both the desktop calibration styles and toolbars. Select the Toolbar from the list to initiate calibration.

In this example there are two touch screen monitors, one with 5 toolbars defined. Selecting one of the listed toolbars will invoke toolbar calibration.

Defined relative to the desktop calibration

UPDD calibrated co-ordinates relate to the virtual video area being 0 to 65535 in both X and Y axis. Given this relationship it is possible to define toolbars relative to this co-ordinate system in fixed locations such that manual calibration is not required   This option has been superseded with the 'Off screen' option in the toolbar setting dialog.

Calculating the toolbar position

In order to specify the position of a toolbar it is required to calculate the toolbar's position relative to the desktop. UPDD works with a nominal video co-ordinate system which defines the primary display having a range of 0 – 65535 for x and y with the origin at the top left.

For each toolbar it is required to calculate the left to right and bottom co-ordinates of each toolbar. The following example illustrates how this is done for a toolbar outside the video area.

Firstly take physical measurements of the 6 values illustrated above.

WT=width of toolbar
HT=height of toolbar
WV=width of video area
HV=height of video area
TT=top of toolbar
LT=left of toolbar

Next calculate left, top, bottom, and right offsets as follows.
Left = LT / WV * 65535
Right = (WT / WV * 65535) + Left
Top = TT / HV * 65535
Bottom = (HT / HV * 65535) + Top

Defining the toolbar position

Having calculated the relative positions you need to associate these values with the toolbar. This can be performed through the UPDD Console, Toolbar dialog, Change Toolbar option or directly editing the configuration files (if you have embedded configuration files with toolbars currently defined)

Change toolbar option

Select the "Change toolbar options" function in the UPDD console, toolbar dialog and enter the 4 values calculated above: e.g

Negative values are used to define toolbars to the left or top of the video area.

Very important note: *Toolbar touch accuracy relies on the main video area being accurately calibrated. The calibrated video area represents the virtual desktop of 65535 X and Y and all toolbars are relative to this calibrated area.*

Embedded Configuration files

On a Windows desktop system, select the "Change toolbar options" function in the UPDD console, toolbar dialog and enter the 4 values calculated above and use the tbupdd.ini file in subsequent image creations.

Toolbar Console dialog

The Toolbar dialog is used to create, configure and save Toolbar definitions and associate actions to the toolbar cells:

Option	Description
Toolbar	Shows the currently selected toolbar and allows selection of other toolbars.
Visual representation	A visual representation of the toolbar cell grid. The currently selected toolbar is shown in Yellow.
Cell id and associated action	Shows cell number, row, column and associated action. In this case the 1st cell of the Annotate toolbar is used to toggle 'Live' annotation over a Windows desktop.
Add a new toolbar	Adds a new toolbar.
Remove this toolbar	Removes a toolbar.
Calibrate toolbar	Calibrates a toolbar.
Change toolbar options	Invokes the change toolbar dialog to adjust toolbar settings.
Change cell options	Invokes the change cell option dialog to define cell settings.
Export Toolbar	Exports toolbar and cell settings to a toolbar configuration file.
Import Toolbar	Imports toolbar and cell settings from a toolbar configuration file. Allows multiple toolbar configuration files to be selected for import.

Toolbar Settings

Toolbar options are defined in the Change Toolbar dialog.

Option	Description

Name	Toolbar name
Rows and Columns	Defines the number of rows and columns i.e. the number of cells within the toolbar.
Placement	Placement values. Defines the position of the toolbar relative to the main desktop co-ordinate system. See above. Arrow increase value sufficient to adjust placement by 1 video pixel.
Enabled	Indicates toolbar is active and enabled. When disabled the toolbar remains defined but hidden until re-enabled.
Follow rotate	Indicates if toolbar is locked (associated) to the desktop display and should be relocated if the video is rotated. If not set, toolbar remains in same physical position irrespective of video rotation. See Rotate documentation.
Show cells	An outline grid is displayed on the desktop to show toolbar / cell placement.
Dragable	Indicates if toolbar can be repositioned by drag. Touching and holding the toolbar for a short period of time allows the toolbar to be moved to a new position.
Highlight cells	The edge of the cell is highlighted when touched.
Activate first	When enabled the first cell touched is activated when the stylus is lifted from the toolbar. When disabled, the current cell touched is activated. In most cases this will be the same cell but this setting does allow for the stylus to be moved across the cells to activate a different cell. If 'Highlight cells' is also enabled then the cells are highlighted as the stylus is dragged around the cells. Virtual and Ascii Key actions are triggered on touch (to emulate a 'real' keyboard stroke) so these cells have an implicit Activate first.
Off screen	With this set RAW co-ordinates are used for calibration. Co-ordinates off of the screen can also be captured. This is used for toolbars that are to be calibrated outside the normal calibrated area in a fix position on the touch device and are not relative to the calibrated area.
Cell frame – colour	Defines the colour of the cell frame.
Fill colour	Defines the background colour of all cells in the toolbar
Transparent	Cells are made transparent such that there is no cell background colour.

Toolbar Cell Actions

Toolbars cells can be associated with UPDD Toolbar functions or are useful for providing control input to an application program using the TBApiRegisterDataCallback API.

UPDD Toolbar functions

These functions, which are tailored to individual operating systems (Window, Mac OS X, Linux, CE), can be used to invoke UPDD utilities (such us on-screen annotation), generate virtual keys, invoke applications, to playback macros (recorded keystrokes and mouse usage), to rotate the display area, to display on-screen keyboards etc.

Selecting the UPDD Console, Toolbar dialog, Change Cell options invokes a dialog to configure the toolbar cell. Depending on the operating system in use the dialog and available functions will differ. The dialog and available functions for each OS is discussed below:

Windows desktop

Under Windows the following cell dialog is used to define cell actions and settings:

The various settings are described below:

Cell Action
These settings are used to associate an action with the cell when it is selected.

The **Copy next keyboard input** option can be selected at any time such that the next keyboard input will be used to set up the desired ASCII or Virtual key, depending on the key sequence entered. Note that due to the odd dual mode behavior of the Windows modifier key the "copy next" option does not work with for this key.

Type of Action	Description
Ascii Key	
	Generate an ASCII key(s). Key to generate can be manually defined or the 'Copy next keyboard input' can be selected so the next input is used to set up the desired ASCII text. Control (modifier) keys Ctrl, Alt, Shift and Windows can be set as required. Repeat means the key is repeated as long as the toolbar is touched. Sticky means the key is held down.
Execute a command	The command to execute is defined. You can either define the full path or use the command 'cmd /c Start [program]' e.g. cmd /c Start Winword, such that the system will use a command shell to locate the program – See also 'Start a Program' below.
Start a Program	Invoke a system program from the internal program list (does not require knowledge of program's location) e.g – WinWord will invoke Microsoft Word, other useful internal commands include Excel, Powerpnt, Notepad, calc (calculator), osk (on screen keyboard), realplay, quicktimeplayer, magnify, iexplore, freecell (card game). Full lists are available on the web.
None	No action defined.
Play Macro	Playback a UPDD mouse and keyboard macro created for the UPDD macro recorder
UPDD Action	Offers a list of specific actions to associate with the cell. In all cases except Ascii and Virtual Keys the action is invoked when the stylus is lifted from the cell. Key strokes are generated at point of touch.

	Annotate xxxx	Start, stop, pause, erase, pen width, pen color functions of the UPDD Annotate program
	Cal-style	Select or Switch calibration styles. Only shown if multiple calibration styles are defined
	Calculator	Load the system calculator
	Calibrate	Invoke calibration
	Calibrate toolbars	Invoke toolbar calibration
	Event Selector	Switch Event states
	Event Selector Primary	Invoke primary Event
	Event Selector Secondary	Invoke secondary Event
	Keyboard	Load a virtual keyboard, system or eyesboard.
		Note: Prior to UPDD version 5.x.x you cannot invoke the system keyboard (osk.exe) on a 64 bit system because the osk.exe is a true 64 bit program and updd toolbar processing is a 32bit program and 32 bit programs cannot invoke 64 bit programs. To overcome this we now ship a program called kblauncher.exe that can be used for this purpose.
	None	No Action
	Rotate	Rotate the screen using one of the supported rotate methods.
	Toolbar	On. off or toggle a specified toolbar.
	Touch	On, off or toggle the touch functionality.

Virtual Key	Generate a virtual key. Key to generate can be manually defined or the 'Copy next keyboard input' can be selected so the next input is used to set up the desired Virtual Key. A lot of the key names are self explanatory, such as VK_Escape generates the ESC key or described on the web, however a few warrant further explanation:

	CMD_LOGOFF	Logoff from Windows
	VX_LWIN / RWIN	Invokes the Windows start menu
	VK_LBUTTON / RBUTTON	Generate a left or right mouse click at current cursor position
	VK_NONE	Introduced to allow modifier keys to be set without generating a key action. E.g cell is needed to enable CTRL. In this case define VK_NONE with Ctrl and Sticky enabled.
	VK_PRIOR / NEXT	Page up / Page down can be used to scroll up and down

Cell Images
A toolbar cell can contain an image. Any colour defined in the image with an RGB of 254 will be deemed transparent when displayed on the desktop. Toolbar images are displayed 'on top' so that no other applications (even 'on top' applications) can cover the toolbar images.

Some images are shipped with the UPDD software. As an example of toolbar cell images, the following are used in the UPDD Annotate application which uses toolbar cells to invoke drawing, pause and erase functions. The mouse images are used in the Event Selector toolbar cell and the button is an example of a button image:

Images can be defined for three different cell states, as described below:

Normal	Untouched state
Pressed	Whilst cell is touched
Toggled	When cell is toggled. A cell can be toggled between two states depending on various UPDD internal

state settings:

Setting	Meaning
\<actioned\>	The action is triggered.
Alt State active	Alternative Event State is active (e.g. right click to be performed).
Anchor Mouse	Anchor mouse is enabled.
UPDD Annotate off	Annotation is inactive
UPDD Annotate on	Annotation is active
UPDD Annotate paused	Annotate is paused
Calibration style	Calibration style switched to the defined calibration style
Enabled	Touch is enabled
Motion	Motion is enabled
Rotate	Rotate state is active
Sound	Sound is active

Cell Sound
Defines the sounds, if any, that are associated to the cell press or release.

Example
This example is shown in the Change Cell Option dialog image at the beginning of this section.

Create a 1 cell toolbar called Start. Select Change cell option and define the type of action as 'Virtual Key' and select the Key code 'VK_LWIN' and select OK. Now press the toolbar and see the Windows start menu appear.

Mac OS X
Under Mac OS X the following cell dialog is used to define cell actions and settings:

This dialog is used to associate an action with the Toolbar when it is pressed.

The various settings are described below:

Type of Action	Description
Ascii Key	Generate an ASCII key(s). Enter the text that you want to be output when the toolbar cell is touched into the "Text" textbox. Controls keys Ctrl, Shift Command and Option can be set as required. For example this could be used to generate CTRL-C.
	The command option is a MAC "modifier" key - command + \<any ascii character\> will do whatever normally happens when the command key on the keyboard and the specified ascii key is pressed. E.g. if Finder is the active application then command + n will create a new finder window.
None	No action defined.
Virtual Key	Generate a virtual key.

Enabled - When checked indicates the cell is active.

Linux
To follow as no cell actions are currently available for the Linux environment.

Testing Toolbars
Once a toolbar is defined you should see no cursor movement when touching within a toolbar.

Under Windows you can also enable cell highlighting to see that the toolbar cell is reacting or define a simple action, say Virtual Key VK_LWIN to see the Windows start bar invoked when touching the cell.

Also under Windows you can run up the Draw and Test utility to view the cell information being passed thro' the driver to receiving applications

Application functions

When a cell is touched this is reported to any application program that has registered an interest using the TBApiRegisterDataCallback function with the _ReadDataTypeToolbar or _ReadDataTypeToolbarEX (UPDD 5.1.0) option:

#define _ReadDataTypeToolbar 0x0010 // toolbar events
TBApiRegisterDataCallback(hd,0,_ReadDataTypeToolbar,CBFunc);

Function CBfunc will be called when a toolbar is touched.

void TBAPI CBFunc(unsigned long context, _PointerData* data)

or with UPDD 5.1.0 and above

The new option ReadDataTypeToolbarEX returns more information, such as stylus id, touching / non-touching status, L/R info allowing a client application to interacted in particular with multi-touch events in a toolbar.

#define _ReadDataTypeToolbarEX 0x200000 // toolbar events extended info
TBApiRegisterDataCallback(hd,0,_ReadDataTypeToolbarEX,CBFunc);

Function CBfunc will be called when a toolbar is touched.

void TBAPI CBFunc(unsigned long context, _PointerData* data)

Integrating the toolbar settings

In order to replicate the toolbar settings on a Windows desktop system (e.g. Windows XP) use the UPDD Console, Status, Dump settings option to create a clone file and integrate this with your distributed installer as described in the Installation Notes document, Installation Options.

For Win CE and XPe see Embedded configuration section above.

Toolbar examples

A number of toolbar examples have been created to show toolbar usage as described below. Click on the link to see the examples in greater detail:

Application	Description	Download/Import
Touch petrol pump	Touch screen used in petrol pump with touch surround toolbars	
Keyboard and app monitor	A general purpose monitor offering touch surround toolbars	
UPDD Annotate	Annotate live on top of active Window desktop	Annotate.zip
Event Selector	UPDD event selector in toolbar form - installed by UPDD >>>>>>	Event Selector.ini
ZoomIt	Presentation tool	Zoomit.zip

Use the download option to download and save the embedded .ini file(s) and content to the updd\toolbar folder. The toolbar(s) can then be imported as required.

Touch petrol pump

In this project 4 toolbars were used to cater for the layout:

Toolbar	Row	Column
Left	7	1
Right	7	1
Alpha	3	13
Numpad	4	3

An external application registered with the UPDD driver to be notified when toolbars were touched and act accordingly.

Example toolbar CE code is available as described in the UPDD Source Code examples document.

Generic touch monitor from Zytronic

Zytronic created a touch surround touch solution for general use utilising 3 toolbars as shown:

UPDD Annotate

Built into the UPDD Windows Daemon task are functions to perform desktop annotation on top of a live Windows desktop. UPDD cell actions are available to control UPDD Annotate settings and a Annotate toolbar has been created as a touch user interface to the annotate functions:

UPDD Annotate functionality was implemented some years ago as part of a television presentation project utilizing a very large touch system. The presenter had the same toolbar on the left and right side of the touch device such that annotation could be enabled, disabled, erased and paused. The toolbars did not use any visual feedback so were invisible to the viewers and presenter. However, the presenter knew where to touch to invoke the desired functionality!

In this example, the Annotate toolbar uses 5 cells to control annotation, as shown below.

> **Action:** Assigned action is Annotate Start / Off. Different images are shown when Annotate is off / on. The Annotate on image is associated with the internal UPDD state setting Annotate = on. When Annotate is on drawing can be made on top of the active Windows desktop
> **Action:** Assigned action is Annotate Pause / Start. Different images are shown when Annotate is on/off or paused. The Annotate paused image is associated with the internal UPDD state setting Annotate = paused. When Annotate is paused, previous drawing remains on screen but the touch screen reverts back to normal operation.
> **Action:** Assigned action is Annotate Erase. Erases all current drawing.
>
> **Action:** Assigned action is Toolbar on /off. Enables a AnnotateColour toolbar to change the current annotation pen colour.

Action: Assigned action is Toolbar on /off. Enables a AnnotateWidth toolbar to change the current annotation pen width.

Download the annotate toolbars from the download table above.

UPDD Event Selector

An Event Selector facility is supplied with UPDD to switch events associated with a device. Common usage is switch between the generation of left and right mouse emulation, as shown below:

Primary

This toolbar implements the Event Selector functionality via a toolbar. The Event Selector is used to switch between the UPDD primary and secondary mouse click emulation modes and is normally used to switch between Left and right click generation.

The toolbar has a single cell with an action of Event Selector which effectively toggles between Primary and Secondary (**alt**ernative) modes. An internal state setting indicates to the driver if the Alt state is active or inactive.

Secondary (Alt)

Two images (with transparent background) are employed, one to indicate when the Primary click mode (alt state = inactive) is to be triggered and one to indicate when the Secondary click mode (alt state = active) is to be triggered, hence the toggled image is associated with the internal UPDD state 'Alt state active'. Given that the two states are normally associated with click modes that invoke left and right clicks then appropriate images are used. Given the transparency of the images the desktop can be seen through the 'transparent' background.

ZoomIt presentation tool

A very neat presentation tool call ZoomIt is available from system internals on the web. The ZoomIt functionality is normally triggered via keyboard and mouse strokes. This toolbar is used to generate the ZoomIt triggers via a touch screen where the utility is used on a large touch screen monitor or whiteboard:

Keystroke triggers	Toolbar cell triggers	Description

Keystroke triggers

ZoomIt - Sysinternals: www.sysinternals.com

ZoomIt v3.03
Copyright © 2006-2009 Mark Russinovich
Sysinternals - www.sysinternals.com

Zoom | LiveZoom | Draw | Type | Break

Once zoomed, toggle drawing mode by pressing the left mouse button. Erase the last entry with Ctrl+Z and all drawing by pressing 'e'. Center the cursor with the space bar. Exit drawing mode by pressing the right mouse button.

Change the pen width by pressing left control and using the mouse wheel or the up and down arrow keys.

Change the pen color by entering drawing mode and typing 'r' (red), 'g' (green), 'b' (blue), 'o' (orange), 'y' (yellow) or 'p' (pink).

Draw a straight line by holding down the Shift key, a rectangle with the Control key, an ellipse with the Tab key, and arrow with Shift+Control.

Clear the screen for a sketch pad by typing 'w' (white) or 'k' (black).

Copy a zoomed screen with Ctrl+C or save it by typing Ctrl+S.

Enter drawing mode without zoom by using the hotkey you specify below.

Draw w/out Zoom: CTRL + 2

☑ Show tray icon   OK   Cancel

Toolbar cell triggers

DRAW ON   DRAW OFF
ERASE ALL   ERASE LAST
R   G
B   O
Y   P
POWER POINT

Description

This example shows how to take a keyboard driven utility and convert it to touch via cell actions.

Each of the cells shown 'generates' the same keyboard action as described in the ZoomIt draw instructions as shown.

The use of transparent background colours on the images means that most of the desktop under the toolbar is seen by the user.

The use of this toolbar has turned a very useful presentation utility to one that can be controlled via touch and shows the potential of toolbar utilization in the touch environment.

The two bottom cells have been configured to invoke PowerPoint and touch screen calibration. The PowerPoint command invoked when the cell is touched can be amended to invoke the desired presentation.

Note: The zoom (magnify) option of ZoomIt cannot readily be used on a touch screen or whiteboard as calibration is inaccurate once the desktop is zoomed. We hope to update our driver at some future date to be able to cater for zoomed desktops such that calibration is automatically adjusted to compensate for the zoomed state.

Download the ZoomIt toolbar from the download table above.

Contact

For further information or technical assistance please email the technical support team at technical@touch-base.com