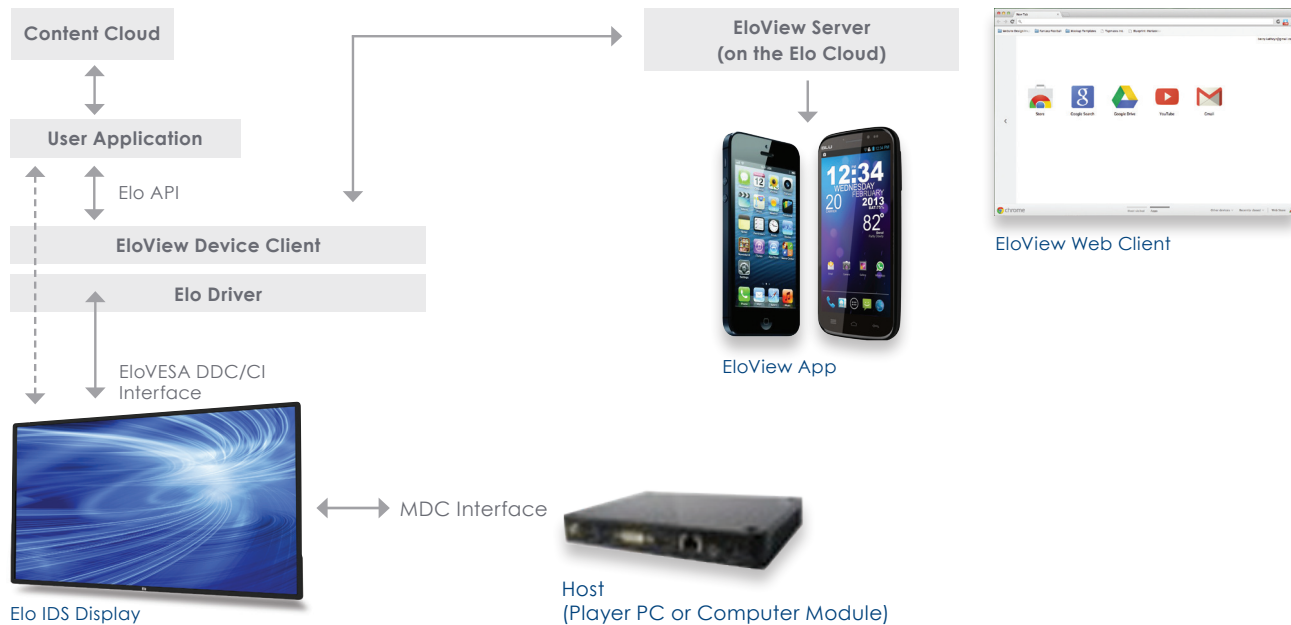


EloView Remote Management: Local API

for 01 Series Interactive Digital Signage (IDS) products



Elo Interactive Digital Signage products now support EloView technology that greatly simplifies remote management and diagnostics. With appropriate software implementation, it will reduce on-premise support calls and help maintain a consistent user experience. EloView has the following components:

Required Materials:

- Local interface to the IDS display (over USB and Display lines)
- A Device Client providing local control of a registered IDS display
- An API (application programming interface) for Windows to access the IDS Display and Computer Module diagnostics and control functions ← **topic of this application note**
- A web based interface that allows central control of the registered fleet of IDS displays and user account management
- A smartphone based application that allows control of a registered IDS display

This document describes the design of the IDS Wrapper Class Interface API. This library (i.e. managed dll) is employed by the Eloview Device Client in the interface to the Elo Server. It can also be utilized for custom user applications.

Target Monitors & Work Environment Requirements

- Elo IDS 01 series
- Microsoft Windows 7 (x86/x64) and forward compatible
- Windows Elo MT 4.5 or above driver has to be preinstalled
- .NET framework is 4.0 or above



Elo founders pioneered the touch screen over 40 years ago. Today, Elo Touch Solutions is a leading global supplier of touch-enabled technology, products and industry solutions.

Elo's Interactive Digital Signage (IDS) products are available in 32" to 70" and include the thinnest (3-3.5") all-in-one commercial touch displays on the market.

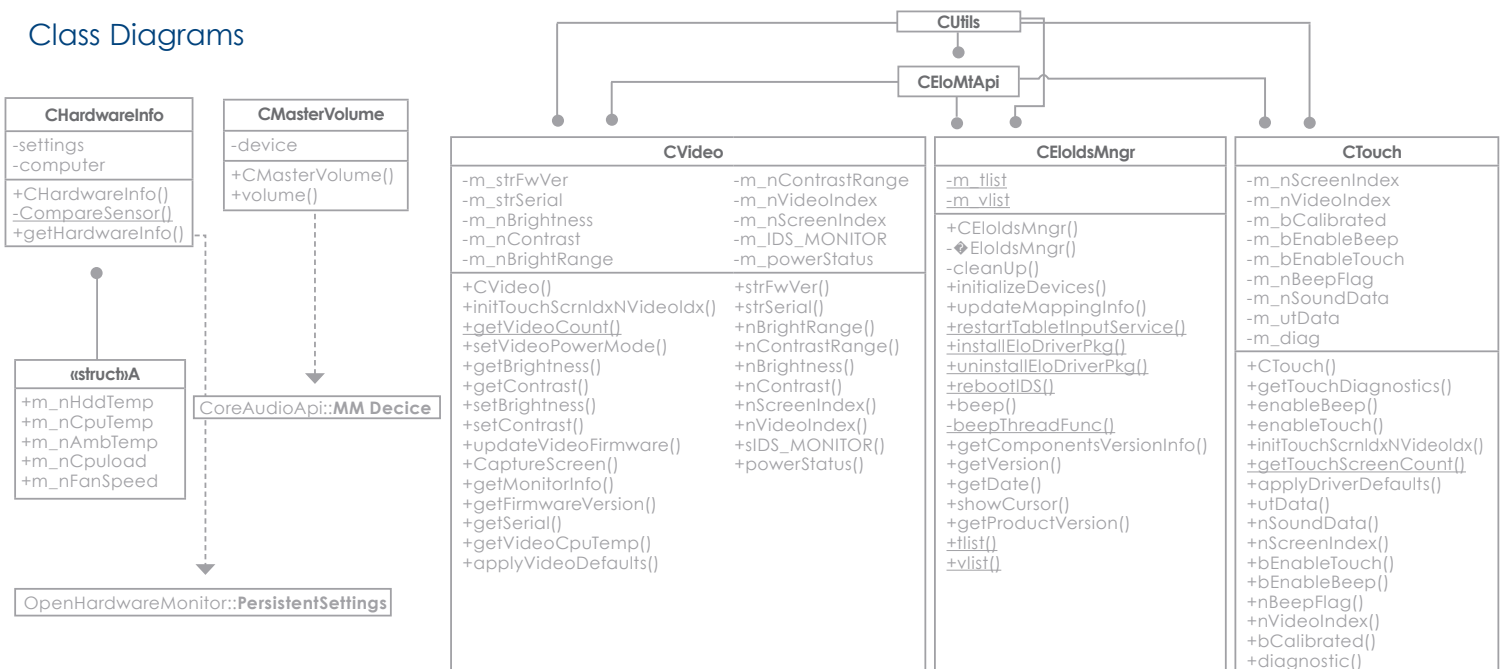
Design Considerations

- This library is a managed dll which hides lower level EloTouch API and exposes only higher level functionalities to the IDS Control Suite and Service
- The dll should be loaded in either the Suite or Service project ready for use in Visual Studio C# project.
- IDS interface API dll is populated to IDS local folder ,“C:\Program Files\Elo TouchSystems”
- Other applications are free to load from any other local location as long as set dll directory or current working directory to “C:\Program Files\Elo TouchSystems” during the application lifetime.
- Target platform is Windows 7 or above forward compatible.
- Application uses .Net 4.0 Framework by default and P/Invoke to access lower level functionalities
- This library is populated by EloSetup installer and loaded by with the Windows Service by the end of installation
- Application generate application event log in case of malfunctions or debugging
- Elo Multi Touch Driver 4.5 or onward must to be installed
- Elo Single Touch G2 Driver is not supported
- Windows XP and Vista are not supported platform
- Unit test is provided for the API to conduct regression testing (boundary checking, type checking, null injections and exception handling) to ensure library quality and functionalities
- Unit test result should be the requirement of every build release. Without passing the unit test suite, the library should not be released to QA or client.

Work Flow Requirements

- In creating client end service Unit test driver the result of unit test should succeed and ensure that all exposed class methods are functional.
- Managed dll should be loaded in Visual Studio Reference. Users are ready to employ public interfaces in Widows Service or IDS Control Suite. However all Elo binary components are populated in C:\Program Files\Elo TouchSystems folder.
- Applications can run any of local folder but Elo binary components has to remain in the C:\Program Files\Elo TouchSystems.
- If target platform needs older .Net Framework, re-select target framework and rebuild the binaries. (Win7 is .NET 4.0 by default)

Class Diagrams



Classes, Structures and Methods

1. Touch Related Features

Class Name: CTouch

CTouch class defines an attributes of touch related functionalities.

Data Members:

```
private int m_nScreenIndex;           // touch screen index
private int m_nVideoIndex;           // video index for mapping
private bool m_bCalibrated;         // holds the status of calibration being applied
private bool m_bEnableBeep;        // enable/disable touch beep
private bool m_bEnableTouch;       // enable/disable touch
private _BEEP_FLAG m_nBeepFlag;     // holds beep flags
private CSoundData m_nSoundData;    // local sound data settings
private CUNTOUCH_TIMEOUT_DATA m_utData; // local untouch time data
private CEloMtApi.MMDevIODIAGNOSTICS m_diag; // Diagnostic result
```

Member Properties: same as data members and public access

Method Name: public CTouch(int nScreenIndex = 0)

Parameters: nScreenIndex [in]: touch screen index

Return Values: an instance of CTouch class with initialized data members

Remarks: Default constructor initializes the data members, EloMtApi.dll as well as mapping of video controller. If the calibration is not done or devices are added or removed, initTouchScrIdxNVideIdx() needs to be invoked to update mapping.

Requirements: Included in Version Elo Multi Touch 4.5 driver package or later.

Method Name: public bool getTouchDiagnostics(ref CEloMtApi.MMDevIODIAGNOSTICS diag)

Parameters: diag [in/out]: CEloMtApi.MMDevIODIAGNOSTICS instance

Return Values: true if successful

Remarks: If the device status is health, diag.ctrl_status is CEloMtApi.CONTRL_STAT.CS_OK

Requirements: Included in Version Elo Multi Touch 4.5 driver package or later.

Method Name: public bool initTouchScrIdxNVideIdx()

Parameters: none

Return Values: Returns true if successful

Remarks: Initializes the touch screen index and video index and maps the indexing if already calibrated otherwise they are default to first video.

Requirements: Included in Version Elo Multi Touch 4.5 driver package or later.

Method Name: public static int getTouchScreenCount()

Parameters: none

Return Values: number to touch screen attached to IDS system

Remarks: This initialized the EloMtApi.dll and internally creates public interface class, then enumerates all attached Elo USB/Serial devices to build internal data structures. This must be called before any of CEloMtApi methods are employed

Requirements

Included in Version Elo Multi Touch 4.5 driver package or later.

Method Name: public bool applyDriverDefaults()

Parameters: none

Return Values: true if successful

Remarks: Apply predefine attributes (in \program files\Elo TouchSystem\EloOption.ini) to all attached touch controllers

Requirements: Included in Version Elo Multi Touch 4.5 driver package or later.

Method Name: public bool updateEloCtrlFirmware ()

Parameters: none

Return Values: true if successful

Remarks: Updates Elo touch controller firmware. Device needs power cycle after this operation.

Requirements: Included in Version Elo Multi Touch 4.5 driver package or later.

2. Video Related Features

Class Name: CVideo

CVideo class defines an attributes of video related functionalities.

Data Members:

```
private String m_strFwVer;           // video firmware version
private String m_strSerial;         // video serial ID
private UInt32 m_nBrightness;       // video brightness
private UInt32 m_nContrast;         // video contrast
private CEloMtApi.RANGE m_nBrightRange; // brightness range
private CEloMtApi.RANGE m_nContrastRange; // contrast range
private int m_nVideoIndex;          // video index
private int m_nScreenIndex;         // touch index
private CEloMtApi.IDS_MONITOR m_IDS_MONITOR; // IDS_MONITOR information
private CEloMtApi.MONITOR_POWER m_powerStatus; // Power Status of Monitor
```

Member Properties: Same as data members and public access

Method Name: public CVideo(int nVideoIndex = 0)

Parameters: nVideoIndex [in]: video index

Return Values: an instance of CVideo class with initialized data members

Remarks: Default constructor initializes the data members, EloMtApi.dll as well as mapping of touch controller and web cam index. If the calibration is not done or devices are added or removed, initTouchScrIdxNVideoIdx() needs to be invoked to update mapping.

Requirements: Included in Version Elo Multi Touch 4.5 driver package or later.

Method Name: public bool initTouchScrIdxNVideoIdx()

Parameters: none

Return Values: true if successful

Remarks: Initializes the touch screen index and maps the indexing if already calibrated otherwise no mapping takes place. Video index and cam index are set equal.

Requirements: Included in Version Elo Multi Touch 4.5 driver package or later.

Method Name: public static int getVideoCount()

Parameters: none

Return Values: the number of video controller attached IDS

Remarks: When EloVideoConfig.dll is loaded, it populates the monitor information. This call will return the result of device emulation.

Requirements: Included in Version Elo Multi Touch 4.5 driver package or later.

Method Name: public UInt32 setVideoPowerMode(PowerStatus powerStatus)

Parameters: powerStatus [in]: PowerStatus flag (MONITOR_POWER_ON, MONITOR_POWER_LOW, MONITOR_POWER_OFF)

Return Values: Win32 Error Code

Remarks: Currently this would apply to all monitors that are attached to IDS system.

Requirements: Included in Version Elo Multi Touch 4.5 driver package or later.

Method Name: public UInt32 getVideoPowerStatus(ref PowerStatus nPowerStatus)

Parameters: nPowerStatus [in/out]: PowerStatus flag (MONITOR_POWER_ON, MONITOR_POWER_LOW, MONITOR_POWER_OFF)

Return Values: Win32 Error Code

Remarks: Currently this would apply to all monitors that are attached to IDS system.

Requirements: Included in Version Elo Multi Touch 4.5 driver package or later.

Method Name: public UInt32 getBrightness(ref UInt32 nBrightness)

Parameters: nBrightness [in/out]: monitor brightness

Return Values: Win32 Error Code

Remarks: value should be within the range given by the m_nBrightRange

Requirements: Included in Version Elo Multi Touch 4.5 driver package or later.

Method Name: public UInt32 getContrast(ref UInt32 nContrast)

Parameters: nContrast [in/out]: monitor contrast

Return Values: Win32 Error Code

Remarks: value should be within the range given by the m_nContrast

Requirements: Included in Version Elo Multi Touch 4.5 driver package or later.

Method Name: public UInt32 setBrightness(UInt32 nBrightness)

Parameters: nBrightness [in]: monitor brightness

Return Values: Win32 Error Code

Remarks: value should be within the range given by the m_nContrast

Requirements: Included in Version Elo Multi Touch 4.5 driver package or later.

Method Name: public UInt32 setContrast(UInt32 nContrast)

Parameters: nContrast [in]: monitor contrast

Return Values: Win32 Error Code

Remarks: value should be within the range given by the m_nContrast

Requirements: Included in Version Elo Multi Touch 4.5 driver package or later.

Method Name: public UInt32 updateVideoFirmware(String strFwVersion, Uri uri)

Parameters: strFwVersion [in]: firmware version in string
uri [in]: Universal Resource Identifier

Return Values: true if successful

Remarks: Updating the video firmware requires power cycle for change to be effective.

Requirements: Included in Version Elo Multi Touch 4.5 driver package or later.

Method Name: public Image CaptureScreen()

Parameters: None

Return Values: bitmap class up cast to Image of current monitor

Remarks: When multiple monitors are attached IDS system. Each monitor handle has to be passed as a parameter and retrieve the snapshot

Requirements: Included in Version Elo Multi Touch 4.5 driver package or later.

Method Name: public UInt32 getMonitorInfo()

Parameters: none

Return Values: Win32 Error Code

Remarks: Internally retrieve m_IDS_MONITOR

Requirements: Included in Version Elo Multi Touch 4.5 driver package or later.

Method Name: public UInt32 getFirmwareVersion(ref string strFwVer)

Parameters: strFwVer[in/out]: Firmware Version in string will be return

Return Values: Win32 Error code

Remarks:

Requirements: Included in Version Elo Multi Touch 4.5 driver package or later.

Method Name: public UInt32 getSerial(ref string serialID)

Parameters: serialID[in]: serial id in string

Return Values: Win32 Error code

Remarks:

Requirements: Included in Version Elo Multi Touch 4.5 driver package or later.

Method Name: public UInt32 getVideoCpuTemp(ref UInt32 nTemp)

Parameters: nTemp[in/out]: retrieve video cpu temperature.

Return Values: Win32 Error code

Remarks:

Requirements: Included in Version Elo Multi Touch 4.5 driver package or later.

Method Name: public UInt32 getMonitorAmbientTemp(ref UInt32 nTemp)

Parameters: nTemp[in/out]: retrieve video ambient temperature.

Return Values: Win32 Error code

Remarks:

Requirements: Included in Version Elo Multi Touch 4.5 driver package or later.

Method Name: public UInt32 applyVideoDefaults()

Parameters: none

Return Values: Win32 Error Code

Remarks: Apply video defaults to this video. Applying defaults to all monitor attached, video list must be enumerated and apply the defaults to each.

Requirements: Included in Version Elo Multi Touch 4.5 driver package or later.

3.0 Volume Control Class

Class Name: CMasterVolume

CMastervolume class retrieve MMDevice instance by enumerating CoreAudioApi.MMDeviceEnumerator library. In order to successfully work this module, CoreAudioApi.dll has to reside where the EloIdLib.dll is stored. This is standalone generic class that does not have any associations to Elo IDS API

Data Members: private CoreAudioApi.MMDevice device;

Member Properties: public float volume // direct access of setter/getter value should be in 0.0 – 1.0 in float

Method Name: public CMasterVolume()

Parameters: none

Return Values: an instance of CMasterVolume with initialized data members.

Remarks: If ever any of the container class instantiations fail, exception is thrown. The CMasterVolume instantiation has to be operated in try catch block.

Requirements: Included in Version Elo Multi Touch 4.5 driver package or later.

4.0 Elo Hardware Info Class

Class Name: CHardwareInfo

CHardwareInfo class has settings and computer data member. Settings will load the predefined hardware retrieval setting in file (application name + ".config"). In order for this module to work properly, OpenHardwareMonitorLib.dll and the config file has to be in the same folder as where EloldsLib.dll resides. In the sample code TestEloldsLib.exe loads TestEloldsLib.config from C:\Program Files\Elo TouchSystems\. This is standalone generic class that does not have any associations to Elo IDS API

Data Members: private PersistentSettings settings;
private Computer computer;

Member Properties: Not available

Method Name: public CHardwareInfo()

Parameters: none

Return Values: an instance of ChardwareInfo with initialized data members.

Remarks: If ever any of the container class instantiations fail, exception is thrown. The CHardwareInfo instantiation has to be operated in try catch block.

Requirements: Included in Version Elo Multi Touch 4.5 driver package or later.

Method Name: public sldsHardInfo getHardwareInfo()

Parameters: none

Return Values: sldsHardInfo structure

```
public struct sldsHardInfo
{
    public int m_nHddTemp;    // Hard Drive temperature
    public int m_nCpuTemp;   // CPU temperature
    public int m_nAmbTemp;   // Ambient temperature
    public int m_nCpuLoad;   // CPU Load
    public int m_nFanSpeed;  // Fan speed
}
```


Remarks: This is expensive call the library go through iterative recursive retrieval of hardware info. Minimize the usage in order to reduce overall cpu load.

Requirements: Included in Version Elo Multi Touch 4.5 driver package or later.

5.0 Elo IDS Management Class

Class Name: CEIoldsMngr

CEIoldsMngr class is the core class that manage all the aspect of touch and video features as well IDS generic operations (such as restart or restart table input service so on). In order to use Elo IDS Interface API. this is the first class needs to be instantiated. During the constructor it initialize video and touch data member and update index mapping. Once the instantiation is complete mapping should be completed and read for use. If calibration has not be performed yet. User would require to run EloVA.exe and calibrate the screens. Then call updateMappingInfo() member method. If Elo Driver installation is not successful and error exists constructor would throw an exception.

Data Members: private static List<CTouch> m_tList; // CTouch class list container
private static List<CVideo> m_vList; // CVideo class list container

Member Properties: Same as data members and public access

Method Name: public CEIoldsMngr()

Parameters: none

Return Values: an instance of CEIoldsMngr with initialized data members.

Remarks: If ever any of the container class instantiations fail, exception is thrown. The CEIoldsMngr instantiation has to be operated in try catch block.

Requirements: Included in Version Elo Multi Touch 4.5 driver package or later.

Method Name: public void initializeDevices()

Parameters: none

Return Values: void

Remarks: Initialize the list of touch and video in case new usb devices/monitors are added/removed

Requirements: Included in Version Elo Multi Touch 4.5 driver package or later.

Method Name: public void updateMappingInfo()

Parameters: none

Return Values: void

Remarks: Need to update mapping of touch and video when calibration is completed.

Requirements: Included in Version Elo Multi Touch 4.5 driver package or later.

Method Name: public void restartTabletInputService()

Parameters: none

Return Values: void

Remarks: Restart table input service of Windows 7 allow touch message to be consume by platform

Requirements: Included in Version Elo Multi Touch 4.5 driver package or later.

Method Name: public static bool installEloDriverPkg(string localPkgDirPath, bool bWaitForCompletion)

Parameters: localPkgDirPath [in]: location of driver package saved in local folder bWaitForCompletion [in]: enable blocking call

Return Values: true if successful

Remarks: Install Elo driver package from the specified local folder

Requirements: Included in Version Elo Multi Touch 4.5 driver package or later.

Method Name: public static bool uninstallEloDriverPkg(bool bWaitForCompletion)

Parameters: bWaitForCompletion [in] : enable blocking call

Return Values: true if successful

Remarks: Result in uninstalling the current multi-touch driver and IDS system reboot is required.

Requirements: Included in Version Elo Multi Touch 4.5 driver package or later.

Method Name: public static bool rebootIDS()

Parameters: none

Return Values: true if successful

Remarks: reboot the current IDS system

Requirements: Included in Version Elo Multi Touch 4.5 driver package or later.

Method Name: public void beep(int freq, int len)

Parameters: freq [in]: frequency of the mother board beep
len [in]: length of the mother board beep Return Values: void

Remarks: Beep event is generated and consumed in application

Requirements: Included in Version Elo Multi Touch 4.5 driver package or later.

Method Name:

```
public void getComponentsVersionInfo(  
    ref string strEloSetup,  
    ref string strEloConfig,  
    ref string strEloBusSys,  
    ref string strEloMTUsbSys,  
    ref string strEloMTSerSys,  
    ref string strEloMTAprSys)
```

Parameters: strEloSetup [out]: the information for "\\Program Files\Elo TouchSystems\EloSetup.exe" strEloConfig [out]: information for "\\Program Files\Elo TouchSystems\EloConfig.exe" strEloConfig [out]: information for "\\Windows\System32\Drivers\EloBus.sys" strEloMTUsbSys [out]: information for "\\Windows\System32\Drivers\EloMtUsb.sys" strEloMTSerSys [out]: information for "\\Windows\System32\Drivers\EloMtSer.sys" strEloMtAprSys [out]: information for "\\Windows\System32\Drivers\EloMtApr.sys"

Return Values: true if successful

Remarks: Retrieved Elo Touch related binary version information.

Requirements: Included in Version Elo Multi Touch 4.5 driver package or later.

Method Name: public string getVersion(bool bGet3Parts)

Parameters: bGetParts [in]: when enabled, returns FileMajorPart, FileMinorPart, FileBuildPart and FilePrivatePart. When disabled, FilePrivatePart is omitted

Return Values: return formatted strings concatenated by white space

Remarks: This returns the ElOldsLib.dll version

Requirements: Included in Version Elo Multi Touch 4.5 driver package or later.

Method Name: public string getDate()

Parameters:

Return Values: returns the formatted today's date in yyyy-mm-dd

Remarks: mlIntended to timestamp for debugging or logging

Requirements: Included in Version Elo Multi Touch 4.5 driver package or later.

Method Name: public void showCursor(bool bShow)

Parameters: bShow [in]: passing true show cursor, passing false disappear cursor.

Return Values: void

Remarks: none

Requirements: Included in Version Elo Multi Touch 4.5 driver package or later.

Method Name: public string getProductVersion(string strFullPath)

Parameters: strFullPath [in]: absolute path to the file interested in its product version

Return Values: Returns product version of specified file in string.

Remarks: none

Requirements: Included in Version Elo Multi Touch 4.5 driver package or later.

6.0 Elo Proprietary Dll are bundled into CEloMtApi class

Please refer to the Elo Driver 4.5 or higher readme file.

7.0 Win32 API are bundled into CUtils class

Please refer to the MSDN for further information.

To find out more about our extensive range of Elo touch solutions, go to www.elotouch.com, or call the office nearest you.

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