

---

## **LIB USER Manual**

---

Version: 3.0

Release: 15/07/2016

---

## Contents

---

|   |          |
|---|----------|
| <b>LIB USER MANUAL .....</b>                | <b>1</b> |
| <b>CONTENTS .....</b>                       | <b>2</b> |
| <b>INTRODUCTION .....</b>                   | <b>4</b> |
| <b>APPROACH TO CALL API FUNCTIONS .....</b> | <b>4</b> |
| <b>API FUNCTIONS .....</b>                  | <b>5</b> |
| ➤ USBIO_SetUSBNOTIFY .....                  | 5        |
| ➤ USBIO_SetTRIGNOTIFY .....                 | 5        |
| ➤ USBIO_GetMAXNUMOFDEV .....                | 5        |
| ➤ USBIO_GetSERIALNO .....                   | 6        |
| ➤ USBIO_OpenDEVICE .....                    | 6        |
| ➤ USBIO_ResetDEVICE .....                   | 6        |
| ➤ USBIO_OpenDEVICEByNUMBER .....            | 6        |
| ➤ USBIO_GetWORKMODE .....                   | 7        |
| ➤ USBIO_GetVERSION .....                    | 7        |
| ➤ USBIO_CloseDEVICE .....                   | 7        |
| ➤ USBIO_CloseDEVICEByNUMBER .....           | 7        |
| ➤ USBIO_I2CAutoGETADDRESS .....             | 8        |
| ➤ USBIO_I2cGETCONFIG .....                  | 8        |
| ➤ USBIO_I2cSETCONFIG .....                  | 9        |
| ➤ USBIO_I2cREAD .....                       | 9        |
| ➤ USBIO_I2cWRITE .....                      | 10       |
| ➤ USBIO_I2cREADEEPROM .....                 | 10       |
| ➤ USBIO_I2cWRITEEEPROM .....                | 11       |
| ➤ USBIO_SPIGETCONFIG .....                  | 11       |
| ➤ USBIO_SPISETCONFIG .....                  | 12       |
| ➤ USBIO_SPITEST .....                       | 12       |
| ➤ USBIO_SPIREAD .....                       | 13       |
| ➤ USBIO_SPIWRITE .....                      | 13       |
| ➤ USBIO_TRIGGETCONFIG* .....                | 13       |
| ➤ USBIO_TRIGSETCONFIG* .....                | 14       |
| ➤ USBIO_WAITFORTRIG* .....                  | 14       |
| ➤ USBIO_EXITTRIG* .....                     | 14       |
| ➤ USBIO_SETCE* .....                        | 14       |
| ➤ USBIO_GETCE* .....                        | 15       |
| ➤ USBIO_GETADCCONFIG* .....                 | 15       |
| ➤ USBIO_SETADCCONFIG* .....                 | 16       |
| ➤ USBIO_ADCREAD* .....                      | 16       |
| ➤ USBIO_GETPWMCONFIG* .....                 | 17       |
| ➤ USBIO_SETPWMCONFIG .....                  | 18       |
| ➤ USBIO_STARTPWM* .....                     | 18       |

---

|                              |           |
|------------------------------|-----------|
| ➤ USBIO_STOPPWM* .....       | 18        |
| ➤ USBIO_GETGPIOCONFIG* ..... | 19        |
| ➤ USBIO_SETGPIOCONFIG* ..... | 19        |
| ➤ USBIO_GPIOREAD* .....      | 19        |
| ➤ USBIO_GPIOWRITE* .....     | 20        |
| <b>THREAD SAFETY .....</b>   | <b>21</b> |

---

---

## Introduction

---

This library provides a simple API to configure and operate USB2UIS devices. The library provides interface abstraction so that users can develop their application without any knowing about the usb. C libraries implementing the USB2UIS Interface Specification are provided for Windows XP or later and Ubuntu14.04 or later. Similarly, various demo project are provided to import library functions into VB,VC,labview,QT and C++builder2009.

## Approach to call API functions

---

There are two approaches to call API functions. One is for a process opening an USB2UIS device, the other is for one process opening more than one USB2UIS devices. One PC can open ten USB2UIS devices simultaneously. Steps show as below table.

| step | Approach One  | Approach Two  |
|------|---|---|
|      | (apply to a process open an USB2UIS)  | (apply to a process open mutli- USB2UIS)  |
| 1    | Call USBIO_SetUSBNotify to monitor the pull-out and plug-in of USB2UIS device                         | Call USBIO_SetUSBNotify to monitor pull-out and plug-in of USB2UIS device                             |
| 2    | Call USBIO_OpenDevice to get device No.   | Call USBIO_GetMaxNumofDev to get max number of USB2UIS that can be opened simultaneously.             |
| 3    | If USB2UIS support trigger, call USBIO_SetTrigNotify to monitor trigger event according to device No. | Call USBIO_GetSerialNo enum all the serial Number of USB2UIS device attached to PC.                   |
| 4    | Call other api function for read/write according to device No.  | Select a serial number to as the parameter of USBIO_OpenDeviceByNumber to get device No.              |
| 5    | Call USBIO_CloseDevice according to device No.  | If USB2UIS support trigger, call USBIO_SetTrigNotify to monitor trigger event according to device No. |
| 6    |   | Call other api function for read/write according to device No.  |
| 7    |   | Call USBIO_CloseDevice to according to device No.   |
|      | Refer to VC demo project(SPI_RW)  | Refer to VC demo project(I2c_RW)  |

---

## API Functions

---

### ➤ USBIO\_SetUSBNotify

---

|                     |   |  |
|---------------------|---|--|
| <b>Prototype</b>    | bool USBIO_SetUSBNotify(USB_DLL_CALLBACK pUSB_Callback)   |  |
| <b>Description</b>  | This function sets a function pointer to lib. When monitored the pull-out or plug-in of USB2UIS device, pUSB_Callback will be called. |  |
| <b>Parameters</b>   | pUSB_Callback   | Function pointer, must define as bool function(BYTE iDevIndex, DWORD iDevStatus) |
|                     |   | iDevIndex: USB2UIS device No.  |
|                     |   | iDevStatus: USB2UIS action ,<br>0x80,plug-in;0,pull-out                          |
| <b>Return value</b> | bool  | Return true if successful  |

### ➤ USBIO\_SetTrigNotify

---

|                     |  |   |        |                           |
|---------------------|--|---|--------|---------------------------|
| <b>Prototype</b>    | bool USBIO_SetTrigNotify(USB_DLL_CALLBACK pTrig_Callback)  |   |        |                           |
| <b>Description</b>  | This function sets a function pointer to lib. When monitored the trigger event of USB2UIS device, pTrig_Callback will be called. |   |        |                           |
| <b>Parameters</b>   | pTrig_Callback   | Function pointer, must define as bool function(BYTE iDevIndex, DWORD iType) |        |                           |
|                     |  | iDevIndex: USB2UIS device No.   |        |                           |
|                     |  | iType High16bit   | unused |                           |
|                     |  | iType Low 16bit   | 0x00AA | IO Trigger                |
|                     |  |   | 0xXXB1 | SPI Slaver recive trigger |
| <b>Return value</b> | bool   | Return true if successful   |        |                           |

### ➤ USBIO\_GetMaxNumofDev

---

|                     |  |                       |
|---------------------|--|-----------------------|
| <b>Prototype</b>    | BYTE USBIO_GetMaxNumofDev(void)  |                       |
| <b>Description</b>  | This function returns the MaxNum of USB2UIS that can be opened simultaneously. |                       |
| <b>Parameters</b>   | None   |                       |
| <b>Return value</b> | BYTE   | the MaxNum of USB2UIS |

---

### ➤ USBIO\_GetSerialNo

---

|                     |  |  |
|---------------------|--|--|
| <b>Prototype</b>    | BYTE USBIO_GetSerialNo(BYTE byIndex,char* lpBuff)                                  |  |
| <b>Description</b>  | This function gets the serial number of USB2UIS and status according to device No. |  |
| <b>Parameters</b>   | byIndex  | USB2UIS device No.   |
|                     | lpBuff   | a char pointer to save serial number   |
| <b>Return value</b> | BYTE   | 0, USB2UIS no exist;<br>1, USB2UIS unused;<br>2, USB2UIS in using;<br>Other: undefined |

### ➤ USBIO\_OpenDevice

---

|                     |   |   |
|---------------------|---|---|
| <b>Prototype</b>    | BYTE USBIO_OpenDevice(void)                                     |   |
| <b>Description</b>  | This function opens a USB2UIS device and returns the device No. |   |
| <b>Parameters</b>   | None  |   |
| <b>Return value</b> | BYTE  | If return is 0xFF, No USB2UIS can be opened |

### ➤ USBIO\_ResetDevice

---

|                     |   |                           |
|---------------------|---|---------------------------|
| <b>Prototype</b>    | BYTE USBIO_ResetDevice(BYTE byIndex,BYTE byDevID)     |                           |
| <b>Description</b>  | This function resets the interface to initial setting |                           |
| <b>Parameters</b>   | byIndex   | USB2UIS device No.        |
|                     | byDevID   | Interface ID, see usbio.h |
| <b>Return value</b> | bool  | Return true if successful |

### ➤ USBIO\_OpenDeviceByNumber

---

|                     |   |   |
|---------------------|---|---|
| <b>Prototype</b>    | BYTE USBIO_OpenDeviceByNumber(char* pSerialString)                                      |   |
| <b>Description</b>  | This function opens the USB2UIS device with specified serial No. and returns device No. |   |
| <b>Parameters</b>   | pSerialString   | A char pointer to save specified serial No.           |
| <b>Return value</b> | BYTE  | If return is 0xFF, it proves no USB2UIS can be opened |

---

➤ **USBIO\_GetWorkMode**

---

|                     |  |  |
|---------------------|--|--|
| <b>Prototype</b>    | bool USBIO_GetWorkMode ( BYTE byIndex, BYTE*lpMode ) |  |
| <b>Description</b>  | This function gets the work mode of USB2UIS device   |  |
| <b>Parameters</b>   | byIndex  | USB2UIS device No.   |
|                     | lpMode   | A byte to pointer to save the work mode of USB2UIS device<br>If its value is 1, work at the upgrade mode<br>If its value is 2, work at the normal mode |
| <b>Return value</b> | bool   | Return true if successful  |

➤ **USBIO\_GetVersion**

---

|                     |  |   |
|---------------------|--|---|
| <b>Prototype</b>    | bool USBIO_GetVersion(BYTE byIndex,BYTE byType,BYTE* lpBuffer) |   |
| <b>Description</b>  | This function gets the veriosn number and build date/time      |   |
| <b>Parameters</b>   | byIndex  | USB2UIS device No.  |
|                     | byType   | Version selection;<br>0 for lib version information<br>1 for drvier version information<br>2 for firmware version information |
|                     | lpBuffer   | A byte pointer to save the informations of version  |
| <b>Return value</b> | bool   | Return true if successful   |

➤ **USBIO\_CloseDevice**

---

|                     |   |                           |
|---------------------|---|---------------------------|
| <b>Prototype</b>    | bool USBIO_CloseDevice(BYTE byIndex)                            |                           |
| <b>Description</b>  | This function closes the USB2UIS device according to device No. |                           |
| <b>Parameters</b>   | byIndex   | USB2UIS device No.        |
| <b>Return value</b> | bool  | Return true if successful |

➤ **USBIO\_CloseDeviceByNumber**

---

|                     |   |                                   |
|---------------------|---|-----------------------------------|
| <b>Prototype</b>    | bool USBIO_CloseDeviceByNumber (char* pSerialString)            |                                   |
| <b>Description</b>  | This function closes the USB2UIS device according to serial No. |                                   |
| <b>Parameters</b>   | pSerialString   | A char pointer to save serial No. |
| <b>Return value</b> | bool  | Return true if successful         |

### ➤ USBIO\_I2cAutoGetAddress

|                     |   |   |
|---------------------|---|---|
| <b>Prototype</b>    | bool USBIO_I2cAutoGetAddress(BYTE byIndex,BYTE* pbyDevAddr)                           |   |
| <b>Description</b>  | This function gets the address of I2c slaver device that connected to USB2UIS device. |   |
| <b>Parameters</b>   | byIndex   | USB2UIS device No.  |
|                     | pbyDevAddr  | A byte pointer to save slaver address.<br>If its value is 0, No I2c slaver device find. |
| <b>Return value</b> | bool  | Return true if successful   |
| <b>remark</b>       | I2c slaver address is at bit7~bit1, bit0 is R/W bit, don't care                       |   |

### ➤ USBIO\_I2cGetConfig

|                     |   |   |
|---------------------|---|---|
| <b>Prototype</b>    | bool USBIO_I2cGetConfig(BYTE byIndex,BYTE* pbyDevAddr,BYTE* pbyRate,DWORD* pdwMilliseconds) |   |
| <b>Description</b>  | This function gets the config of I2c port   |   |
| <b>Parameters</b>   | byIndex   | USB2UIS device No.  |
|                     | pbyDevAddr  | A byte pointer to save slaver address   |
|                     | pbyRate   | A byte pointer to save i2c frequency.<br>If its value is 0, frequency is 100K<br>If its value is 1, frequency is 200K<br>If its value is 2, frequency is 300K<br>If its value is 3, frequency is 400K<br>If its value is 4, frequency is 800K |
|                     | pdwMilliseconds   | A DWORD pointer to save i2c R/W timeout,unit:MS<br>Low 16bit for read timerout;<br>High 16bit for write timeout;  |
| <b>Return value</b> | bool  | Return true if successful   |
| <b>remark</b>       | I2c slaver address is at bit7~bit1, bit0 is R/W bit, don't care                             |   |



### ➤ USBIO\_I2cSetConfig

|                     |  |  |
|---------------------|--|--|
| <b>Prototype</b>    | bool USBIO_I2cSetConfig (BYTE byIndex,BYTE byDevAddr,BYTE byRate,DWORD dwMilliseconds) |  |
| <b>Description</b>  | This function sets the config of i2c port  |  |
| <b>Parameters</b>   | byIndex  | USB2UIS device No.   |
|                     | byDevAddr  | I2c slaver address   |
|                     | byRate   | I2c frequency index, 0~4 represents 100K, 200K, 300K, 400K, 800k respectively.               |
|                     | dwMilliseconds   | I2c R/W timeout,unit: MS ;<br>Low 16 bit for read timeout;<br>High 16 bit for write timeout; |
| <b>Return value</b> | bool   | Return true if successful  |
| <b>remark</b>       | I2c slaver address is at bit7~bit1, bit0 is R/W bit, don't care                        |  |

### ➤ USBIO\_I2cRead

|                     |  |   |
|---------------------|--|---|
| <b>Prototype</b>    | bool USBIO_I2cRead(BYTE byIndex, BYTE byDevAddr, BYTE* lpParaBuffer, BYTE byParaSize, BYTE* lpReadBuffer,WORD wReadSize) |   |
| <b>Description</b>  | This function reads the data from i2c slaver .   |   |
| <b>Parameters</b>   | byIndex  | USB2UIS device No.  |
|                     | byDevAddr  | I2c slaver address  |
|                     | lpParaBuffer   | A byte pointer to save the command data send to i2c slaver before read, if none, set byParaSize = 0 |
|                     | byParaSize   | The length of command data  |
|                     | lpReadBuffer   | A byte pointer to save the data read from i2c slaver  |
|                     | wReadSize  | The length of data read from i2c slaver   |
| <b>Return value</b> | bool   | Return true if successful   |
| <b>remark</b>       | I2c slaver address is at bit7~bit1, bit0 is R/W bit, don't care  |   |

### ➤ USBIO\_I2cWrite

|                     |   |  |
|---------------------|---|--|
| <b>Prototype</b>    | bool USBIO_I2cWrite (BYTE byIndex, BYTE byDevAddr, BYTE* lpParaBuffer, BYTE byParaSize, BYTE* lpWriteBuffer, WORD wWriteSize) |  |
| <b>Description</b>  | This function writes data to i2c slaver   |  |
| <b>Parameters</b>   | byIndex   | USB2UIS device No.   |
|                     | byDevAddr   | I2c slaver address   |
|                     | lpParaBuffer  | A byte pointer to save the command data send to i2c slaver before write, if none, set byParaSize = 0 |
|                     | byParaSize  | The length of command data   |
|                     | lpWriteBuffer   | A byte pointer to save the data write to i2c slaver  |
|                     | wWriteSize  | The length of data write to i2c slaver   |
| <b>Return value</b> | bool  | Return true if successful  |
| <b>remark</b>       | I2c slaver address is at bit7~bit1, bit0 is R/W bit, don't care   |  |

### ➤ USBIO\_I2cReadEEProm

|                     |  |  |
|---------------------|--|--|
| <b>Prototype</b>    | bool USBIO_I2cReadEEProm(BYTE byIndex, BYTE byDevAddr, BYTE byTypeIndex, DWORD dwOffset, BYTE* lpReadBuffer, WORD wReadSize) |  |
| <b>Description</b>  | This function reads data from eeprom   |  |
| <b>Parameters</b>   | byIndex  | USB2UIS device No.   |
|                     | byDevAddr  | I2c slaver address, here must be 0xA0                        |
|                     | byTypeIndex  | EEPROM type index, 0~12 represent 24C01~24C4096 respectively |
|                     | dwOffset   | The start address of EEPROM                                  |
|                     | lpReadBuffer   | A byte pointer to save the data read from eeprom             |
|                     | wReadSize  | The length of data read from eeprom                          |
| <b>Return value</b> | bool   | Return true if successful                                    |
| <b>remark</b>       | I2c slaver address is at bit7~bit1, bit0 is R/W bit, don't care  |  |

### ➤ USBIO\_I2cWriteEEProm

|                     |   |  |
|---------------------|---|--|
| <b>Prototype</b>    | bool USBIO_I2cWriteEEProm(BYTE byIndex, BYTE byDevAddr, BYTE byTypeIndex, DWORD dwOffset, BYTE* lpReadBuffer, WORD wReadSize) |  |
| <b>Description</b>  | This function writes data to eeprom   |  |
| <b>Parameters</b>   | byIndex   | USB2UIS device No.   |
|                     | byDevAddr   | I2c slaver address,here must be 0xA0                         |
|                     | byTypeIndex   | EEPROM type index, 0~12 represent 24C01~24C4096 respectively |
|                     | dwOffset  | The start address of EEPROM                                  |
|                     | lpWriteBuffer   | A byte pointer to save the data write to eeprom              |
|                     | wWriteSize  | The length of data write to eeprom                           |
| <b>Return value</b> | bool  | Return true if successful                                    |
| <b>remark</b>       | I2c slaver address is at bit7~bit1, bit0 is R/W bit, don't care   |  |

### ➤ USBIO\_SPIGetConfig

|                     |  |  |
|---------------------|--|--|
| <b>Prototype</b>    | bool USBIO_SPISetConfig (BYTE byIndex, BYTE * pbyRate, DWORD* pdwMilliseconds) |  |
| <b>Description</b>  | This function gets the config of SPI port                                      |  |
| <b>Parameters</b>   | byIndex  | USB2UIS device No.   |
|                     | pbyRate  | <p>A byte pointer to save SPI config, its value shows as below:</p> <p>bit3~bit0 is SPI frequency index: 0~8 represent 200k, 400k, 600k, 800k, 1M, 2M, 4M, 6M, 12M respectively.</p> <p>bit5~bit4 is SPI mode:</p> <p>00: SCK is low level in the idle state, the first edge sampled data in the SCK cycle.</p> <p>01: SCK is high level in the idle state, the first edge sampled data in the SCK cycle.</p> <p>10: SCK is low level in the idle state, the second edge sampled data in the SCK cycle.</p> <p>11: SCK is high level in the idle state, the second edge sampled data in the SCK cycle.</p> <p>bit6 is unused</p> <p>bit7 is m/s : 0 as master; 1 as slaver</p> |
|                     | pdwMilliseconds  | <p>A DWORD pointer to save SPI R/W timeout,unit:MS</p> <p>Low 16bit for read timerout;</p> <p>High 16bit for write timeout;</p>  |
| <b>Return value</b> | bool   | Return true if successful  |

### ➤ USBIO\_SPISetConfig

|                     |   |   |
|---------------------|---|---|
| <b>Prototype</b>    | bool USBIO_SPISetConfig (BYTE byIndex,BYTE byRate,DWORD dwMilliseconds) |   |
| <b>Description</b>  | This function sets the config of SPI port                               |   |
| <b>Parameters</b>   | byIndex   | USB2UIS device No.  |
|                     | byRate  | <p>Its value shows as below:</p> <p>bit3~bit0 is SPI frequency index: 0~8 represent 200k, 400k, 600k, 800k, 1M, 2M, 4M, 6M, 12M respectively.</p> <p>bit5~bit4 is SPI mode:</p> <p>00: SCK is low level in the idle state, the first edge sampled data in the SCK cycle.</p> <p>01: SCK is high level in the idle state, the first edge sampled data in the SCK cycle.</p> <p>10: SCK is low level in the idle state, the second edge sampled data in the SCK cycle.</p> <p>11: SCK is high level in the idle state, the second edge sampled data in the SCK cycle.</p> <p>bit6 is unused</p> <p>bit7 is m/s : 0 as master; 1 as slaver</p> |
|                     | dwMilliseconds  | <p>SPI R/W timeout,unit: MS ;</p> <p>Low 16 bit for read timeout;</p> <p>High 16 bit for write timeout;</p>   |
| <b>Return value</b> | bool  | Return true if successful   |

### ➤ USBIO\_SPITest

|                     |   |  |
|---------------------|---|--|
| <b>Prototype</b>    | bool USBIO_SPITest(BYTE byIndex,BYTE* lpWriteBuffer,BYTE* lpReadBuffer,BYTE byTestSize) |  |
| <b>Description</b>  | This function does the test of SPI-loop. MISO and MOSI must connect together first.     |  |
| <b>Parameters</b>   | byIndex   | USB2UIS device No.                                 |
|                     | lpWriteBuffer   | A byte pointer to save SPI data sent to MOSI       |
|                     | lpReadBuffer  | A byte pointer to save SPI data received from MISO |
|                     | byTestSize  | The length of test data, must no more than 8       |
| <b>Return value</b> | bool  | Return true if successful                          |

### ➤ USBIO\_SPIRead

|                     |   |  |
|---------------------|---|--|
| <b>Prototype</b>    | bool USBIO_SPIRead(BYTE byIndex, BYTE* lpComBuffer, BYTE byComSize, BYTE* lpBuffer, WORD wBuffSize) |  |
| <b>Description</b>  | This function reads data from SPI device  |  |
| <b>Parameters</b>   | byIndex   | USB2UIS device No.   |
|                     | lpComBuffer   | A byte pointer to save command data send to SPI device before read. If none , byComSize should set to 0. |
|                     | byComSize   | The length of comand data.   |
|                     | lpReadBuffer  | A byte pointer to save the data read from SPI device   |
|                     | wReadSize   | The length of data to read from SPI device.  |
| <b>Return value</b> | bool  | Return true if successful  |

### ➤ USBIO\_SPIWrite

|                     |   |   |
|---------------------|---|---|
| <b>Prototype</b>    | bool USBIO_SPIWrite(BYTE byIndex, BYTE* lpComBuffer, BYTE byComSize, BYTE* lpWriteBuffer,WORD wWriteSize) |   |
| <b>Description</b>  | This function writes data to SPI device   |   |
| <b>Parameters</b>   | byIndex   | USB2UIS device No.  |
|                     | lpComBuffer   | A byte pointer to save command data send to SPI device before write. If none , byComSize should set to 0. |
|                     | byComSize   | The length of comand data.  |
|                     | lpWriteBuffer   | A byte pointer to save the data write to SPI device   |
|                     | wWriteSize  | The length of data write to SPI device.   |
| <b>Return value</b> | bool  | Return true if successful   |

### ➤ USBIO\_TrigGetConfig\*

|                     |  |  |
|---------------------|--|--|
| <b>Prototype</b>    | bool USBIO_TrigGetConfig(BYTE byIndex,BYTE* pbySelect) |  |
| <b>Description</b>  | This functin gets the interrupt type of IRQ pin.       |  |
| <b>Parameters</b>   | byIndex  | USB2UIS device No.   |
|                     | pbySelect  | A byte pointer to save IRQ interrupt type,its value shows as below:<br>0: raising trigger<br>1: falling trigger<br>2: high level trigger<br>3: low level trigger |
| <b>Return value</b> | bool   | Return true if successful  |
| <b>Remark</b>       | This functions is only available for exteneded type.   |  |

---

➤ USBIO\_TrigSetConfig\*

|                     |  |  |
|---------------------|--|--|
| <b>Prototype</b>    | bool USBIO_TrigSetConfig(BYTE byIndex,BYTE bySelect) |  |
| <b>Description</b>  | This function sets the interrupt type of IRQ pin     |  |
| <b>Parameters</b>   | byIndex  | USB2UIS device No.   |
|                     | bySelect   | IRQ interrupt type, its value shows as below:<br>0: raising trigger<br>1: falling trigger<br>2: high level trigger<br>3: low level trigger |
| <b>Return value</b> | bool   | Return true if successful  |
| <b>Remark</b>       | This functions is only available for extended type.  |  |

---

➤ USBIO\_WaitForTrig\*

|                     |   |                           |
|---------------------|---|---------------------------|
| <b>Prototype</b>    | bool USBIO_WaitForTrig(BYTE byIndex)                |                           |
| <b>Description</b>  | This function enables the trigger of IQR pin.       |                           |
| <b>Parameters</b>   | byIndex   | USB2UIS device No.        |
| <b>Return value</b> | bool  | Return true if successful |
| <b>Remark</b>       | This functions is only available for extended type. |                           |

---

➤ USBIO\_ExitTrig\*

|                     |   |                           |
|---------------------|---|---------------------------|
| <b>Prototype</b>    | bool USBIO_ExitTrig(BYTE byIndex)                   |                           |
| <b>Description</b>  | This function disables the trigger of IRQ pin.      |                           |
| <b>Parameters</b>   | byIndex   | USB2UIS device No.        |
| <b>Return value</b> | bool  | Return true if successful |
| <b>Remark</b>       | This functions is only available for extended type. |                           |

---

➤ USBIO\_SetCE\*

|                     |   |   |
|---------------------|---|---|
| <b>Prototype</b>    | bool USBIO_SetCE(BYTE byIndex, bool bHigh)          |   |
| <b>Description</b>  | This function set the level of CE1 output           |   |
| <b>Parameters</b>   | byIndex   | USB2UIS device No.  |
|                     | bHigh   | If true,set CE1 output high; if false, set CE1output low. |
| <b>Return value</b> | bool  | Return true if successful                                 |
| <b>Remark</b>       | This functions is only available for extended type. |   |

➤ USBIO\_GetCE\*

|                     |  |  |
|---------------------|--|--|
| <b>Prototype</b>    | bool USBIO_GetCE(BYTE byIndex, BYTE* pbyLevel)       |  |
| <b>Description</b>  | This function gets the level of CE1 output           |  |
| <b>Parameters</b>   | byIndex  | USB2UIS device No.   |
|                     | pbyLevel   | A byte pointer to save CE1 level. Its value shows as below:<br>1: CE1 output is high;<br>0: CE1 output is low; |
| <b>Return value</b> | bool   | Return true if successful  |
| <b>Remark</b>       | This functions is only available for exteneded type. |  |

➤ USBIO\_GetADCConfig\*

|                     |   |   |
|---------------------|---|---|
| <b>Prototype</b>    | bool USBIO_GetADCConfig(BYTE byIndex, BYTE* pbyMask, BYTE* pbyIOSelect) |   |
| <b>Description</b>  | This function gets the config of ADC port                               |   |
| <b>Parameters</b>   | byIndex   | USB2UIS device No.  |
|                     | pbyMask   | A byte pointer to save ADC channle switch, its value shows as below:<br>bit7~bit4: unused<br>bit3 : 1/0 ADC channel 4 on/off<br>bit2 : 1/0 ADC channel 3 on/off<br>bit1 : 1/0 ADC channel 2on/off<br>bit0 : 1/0 ADC channel 1 on/off  |
|                     | pbyIOSelect   | A bytewidth pointer to save the pin seletion of 4 ADC channels.<br>The 1st byte is for ADC channel 1.<br>The 2nd byte is for ADC channel 2.<br>The 3rd byte is for ADC channel 3.<br>The 4th byte is for ADC channel 4.<br>High nibble of each byte is for positive pole selection of ADC channel . its value represents J7-03 ~J7-10,internal temperature sensor and VDD respectively.<br>Low nibble of each byte is for negative pole selection of ADC channel . its value represents J7-03 ~J7-10,internal refererce voltage and GND respectively. |
| <b>Return value</b> | bool  | Return true if successful   |
| <b>Remark</b>       | This functions is only available for exteneded type.                    |   |

➤ USBIO\_SetADCConfig\*

|                     |   |   |
|---------------------|---|---|
| <b>Prototype</b>    | bool USBIO_SetADCConfig(BYTE byIndex, BYTE byMask, BYTE* pbyIOSelect) |   |
| <b>Description</b>  | This function sets the config of ADC channels.                        |   |
| <b>Parameters</b>   | byIndex   | USB2UIS device No.  |
|                     | byMask  | ADC channle switch, its value shows as below:<br>bit7~bit4: unused<br>bit3 : 1/0 ADC channel 4 on/off<br>bit2 : 1/0 ADC channel 3 on/off<br>bit1 : 1/0 ADC channel 2on/off<br>bit0 : 1/0 ADC channel 1 on/off   |
|                     | *byIOSelect   | A bytewriter to save the pin seletion of four ADC channels.<br>The 1st byte is for ADC channel 1.<br>The 2nd byte is for ADC channel 2.<br>The 3rd byte is for ADC channel 3.<br>The 4th byte is for ADC channel 4.<br>High nibble of each byte is for positive pole selection of ADC channel . its value represents J7-03 ~J7-10,internal temperature sensor and VDD respectively.<br>Low nibble of each byte is for negative pole selection of ADC channel . its value represents J7-03 ~J7-10,internal refererce voltage and GND respectively. |
| <b>Return value</b> | bool  | Return true if successful   |
| <b>Remark</b>       | This functions is only available for exteneded type.                  |   |

➤ USBIO\_ADCRead\*

|                     |  |  |
|---------------------|--|--|
| <b>Prototype</b>    | bool USBIO_ADCRead(BYTE byIndex, WORD* lpReadBuffer, WORD wBuffSize) |  |
| <b>Description</b>  | This function reads the data sampled from ADC channels .             |  |
| <b>Parameters</b>   | byIndex  | USB2UIS device No.   |
|                     | lpReadBuffer   | A word pointer to save the data read from ADC channel.   |
|                     | wBuffSize  | The length of data read from ADC channel. wBuffSize must equal the mutilples of ADC channels opened. |
| <b>Return value</b> | bool   | Return true if successful  |
| <b>Remark</b>       | This functions is only available for exteneded type.                 |  |



➤ USBIO\_GetPWMConfig\*

|                     |  |   |
|---------------------|--|---|
| <b>Prototype</b>    | bool USBIO_GetPWMConfig(BYTE byIndex, BYTE* pbyRate, BYTE* pbyNum, WORD* pwDuty) |   |
| <b>Description</b>  | This function gets the config of PWM port  |   |
| <b>Parameters</b>   | byIndex  | USB2UIS device No.  |
|                     | pbyRate  | A byte pointer to save PWM frequency index. Its value (0~10) represents 1k, 2k, 4k, 6k, 8k, 10k, 20k, 40k, 50k, 60k, 100k respectively.   |
|                     | pbyNum   | A byte pointer to save the status of PWM channels. Its value show as below:<br>bit7: 1 / 0 PWM on/off<br>bit6~0:<br>0 all the PWM channel off<br>1 PWM channel 1 on<br>2 PWM channel 1 ,2 on<br>3 PWM channel 1 ,2,3 on<br>4 PWM channel 1,2,3,4 on   |
|                     | pwDuty   | A word pointer to save the duty of each PWM channel. Duty unit: 0.001.<br>The 1 <sup>st</sup> word: the duty of PWM channel 1<br>The 2 <sup>nd</sup> word: the duty of PWM channel 2.<br>The 3 <sup>rd</sup> word: the duty of PWM channel 3.<br>The 4 <sup>th</sup> word: the duty of PWM channel 4. |
| <b>Return value</b> | bool   | Return true if successful   |
| <b>Remark</b>       | This functions is only available for exteneded type.                             |   |

### ➤ USBIO\_SetPWMConfig

|                     |   |  |
|---------------------|---|--|
| <b>Prototype</b>    | bool USBIO_SetPWMConfig(BYTE byIndex, BYTE byRate, BYTE byNum, WORD*pwDuty) |  |
| <b>Description</b>  | This function sets the config of PWM port                                   |  |
| <b>Parameters</b>   | byIndex   | USB2UIS device No.   |
|                     | byRate  | PWM frequency index, its value(0~10)represents 1k, 2k, 4k, 6k, 8k, 10k, 20k, 40k, 50k, 60k, 100k respectively.   |
|                     | byNum   | the status of PWM channels.<br>Its value show as below:<br>bit7: 1 / 0 PWM on/off<br>bit6~0:<br>0 all the PWM channel off<br>1 PWM channel 1 on<br>2 PWM channel 1 ,2 on<br>3 PWM channel 1 ,2,3 on<br>4 PWM channel 1,2,3,4 on  |
|                     | pwDuty  | A word pointer to save the duty of each PWM channel.<br>Duty unit: 0.001.<br>The 1 <sup>st</sup> word: the duty of PWM channel 1<br>The 2 <sup>nd</sup> word: the duty of PWM channel 2.<br>The 3 <sup>rd</sup> word: the duty of PWM channel 3.<br>The 4 <sup>th</sup> word: the duty of PWM channel 4. |
| <b>Return value</b> | bool  | Return true if successful  |
| <b>Remark</b>       | This functions is only available for exteneded type.                        |  |

### ➤ USBIO\_StartPWM\*

|                     |  |                           |
|---------------------|--|---------------------------|
| <b>Prototype</b>    | bool USBIO_StartPWM(BYTE byIndex)                    |                           |
| <b>Description</b>  | This function switches on PWM.                       |                           |
| <b>Parameters</b>   | byIndex  | USB2UIS device No.        |
| <b>Return value</b> | bool   | Return true if successful |
| <b>Remark</b>       | This functions is only available for exteneded type. |                           |

### ➤ USBIO\_StopPWM\*

|                     |  |                           |
|---------------------|--|---------------------------|
| <b>Prototype</b>    | bool USBIO_StopPWM(BYTE byIndex)                     |                           |
| <b>Description</b>  | This function switches off PWM.                      |                           |
| <b>Parameters</b>   | byIndex  | USB2UIS device No.        |
| <b>Return value</b> | bool   | Return true if successful |
| <b>Remark</b>       | This functions is only available for exteneded type. |                           |

➤ USBIO\_GetGPIOConfig\*

|                     |  |   |
|---------------------|--|---|
| <b>Prototype</b>    | bool USBIO_GetGPIOConfig(BYTE byIndex, BYTE* pbyValue) |   |
| <b>Description</b>  | This function gets the direction of GPIO.              |   |
| <b>Parameters</b>   | byIndex  | USB2UIS device No.  |
|                     | pbyValue   | A byte pointer to save GPIO direction. The bit0~bit7 of its value represents J7-10~J7-03 respectively.<br>1/0: input/output |
| <b>Return value</b> | bool   | Return true if successful   |
| <b>Remark</b>       | This functions is only available for extended type.    |   |

➤ USBIO\_SetGPIOConfig\*

|                     |  |  |
|---------------------|--|--|
| <b>Prototype</b>    | bool USBIO_SetGPIOConfig(BYTE byIndex, BYTE byValue) |  |
| <b>Description</b>  | This function sets the direction of GPIO port.       |  |
| <b>Parameters</b>   | byIndex  | USB2UIS device No.   |
|                     | byValue  | GPIO direction. The bit0~bit7 of its value represents J7-10~J7-03 respectively.<br>1/0: input/output |
| <b>Return value</b> | bool   | Return true if successful  |
| <b>Remark</b>       | This functions is only available for extended type.  |  |

➤ USBIO\_GPIORead\*

|                     |   |   |
|---------------------|---|---|
| <b>Prototype</b>    | bool USBIO_GPIORead(BYTE byIndex, BYTE* pbyValue)   |   |
| <b>Description</b>  | This function gets the levels of GPIO port.         |   |
| <b>Parameters</b>   | byIndex   | USB2UIS device No.  |
|                     | pbyValue  | A byte pointer to save GPIO levels. The bit0~bit7 of its value represents J7-10~J7-03 respectively.<br>1/0: High level/low level. |
| <b>Return value</b> | bool  | Return true if successful   |
| <b>Remark</b>       | This functions is only available for extended type. |   |

➤ USBIO\_GPIOWrite\*

|                     |  |   |
|---------------------|--|---|
| <b>Prototype</b>    | USBIO_GPIOWrite(BYTE byIndex,BYTE byValue,BYTE byMask) |   |
| <b>Description</b>  | This function sets the levels of GPIO port.            |   |
| <b>Parameters</b>   | byIndex  | USB2UIS device No.  |
|                     | byValue  | GPIO levels. The bit0~bit7of its value represents J7-10~J7-03 respectively.<br>1/0: High level/low level.                         |
|                     | byMask   | GPIO Mask, The bit0~bit7of its value represents J7-10~J7-03 respectively.<br>If the bit is 1, the corresponding pin is only read. |
| <b>Return value</b> | bool   | Return true if successful   |
| <b>Remark</b>       | This functions is only available for exteneded type.   |   |

---

## Thread Safety

---

The USB2UIS library and associated functions are not thread safe. This means that calling library functions simultaneously from multiple threads may have undesirable effects.

To use the library functions in more than one thread, the user should do the following: Call library functions from within a critical section such that only a single function is being called at any given time. If a function is being called in one thread, then the user must prevent another thread from calling any function until the first function returns.