PISO-Encoder600/Encoder300

6-axis/3axis 32-bit Encoder Card

Linux Software Manual

Tables of Content

1.   Linux Software Installation

The PISO-Encoder600/Encoder300 can be used in linux kernel 2.4.X/2.6.X ~ 4.0.0. For Linux OS, the recommended installation and uninstall steps are given in Sec 1.1 ~ 1.2

1.1. Linux Driver Installing Procedure

Step 1: Copy the linux driver "ixpio-0.22.9.tar.gz" (or the later driver version) in the directory "NAPDOS\Linux" of the companion CD or download the latest driver from our website to the linux host.

Step 2: You must use the '**root**' identity to compile and install PIO/PISO linux driver.

Step 3: Decompress the tarball "ixpio.tar.gz".

Step 4: Type '**cd**' to the directory containing the package's source code and type '**./configure**' to configure the package for your linux system.

Step 5: Type '**make**' to compile the package.

Step 6: You can type '**./ixpio.inst**' to install the PIO/PISO driver module and build the device file "ixpioX" in the device directory "/dev" automatically.

1.2. Linux Driver Uninstalling Procedure

Step 1: Type '**cd**' to the directory containing the package's source code.

Step 2: Type '**./ixpio.remove**' to remove the PIO/PISO driver module.

2. Static Library Function Description

The static library is the collection of function calls of the PISO Encoder cards for linux kernel 2.4.x/2.6.x ~ 4.0.0 system. The application structure is presented as following figure. The user application program developed by C(C++) language can call library "libenc600.a" in user mode. And then static library will call the module ixpio to access the hardware system.
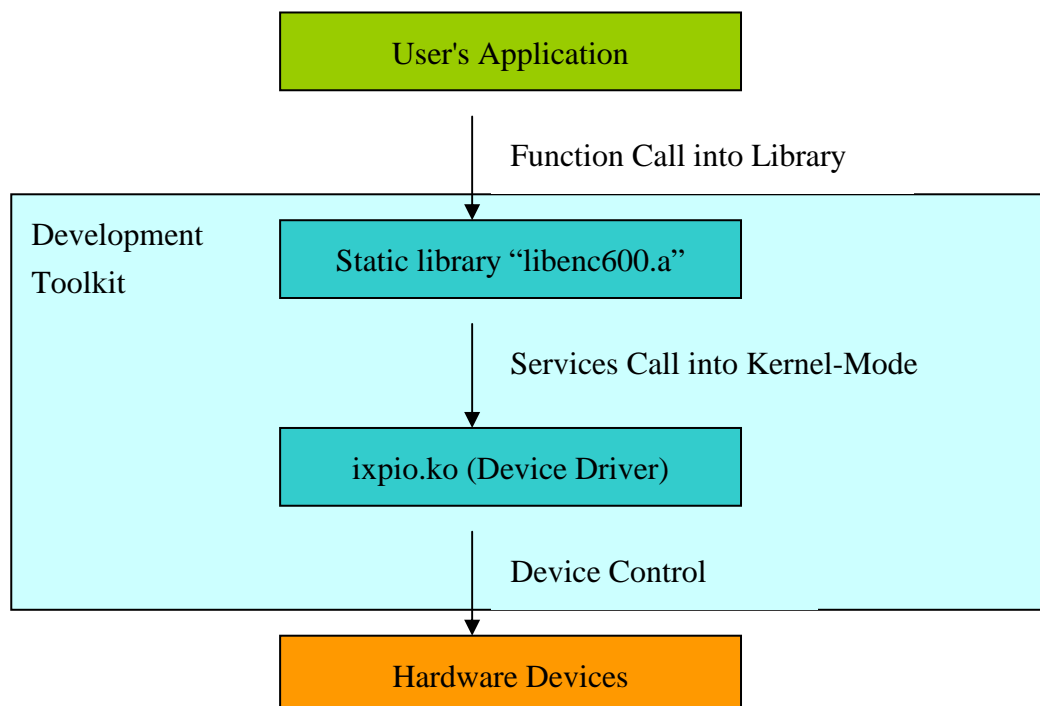

Figure 2.1

2.1 Table of ErrorCode and ErrorString

Table 2.1

Error Code	Error ID	Error String
0	SUCCESS	OK (No error !)
-1	FAILURE	PISO Encoder Error

2.2 Function Descriptions

Table 2.2

Function Definition
int ENC6_REGISTRATION(unsigned char cardNo, unsigned int address, int dev_file_para);
void ENC6_INIT_CARD(unsigned char cardNo, unsigned char x1_mode, unsigned char x2_mode, unsigned char x3_mode, unsigned char x4_mode, unsigned char x5_mode, unsigned char x6_mode);
void ENC6_CONFIG(unsigned char cardNo, unsigned char x1_mode, unsigned char x2_mode, unsigned char x3_mode, unsigned char x4_mode, unsigned char x5_mode, unsigned char x6_mode);
unsigned long ENC6_GET_ENCODER(unsigned char cardNo, unsigned char axis);
void ENC6_RESET_ENCODER(unsigned char cardNo, unsigned char axis);
unsigned char ENC6_GET_INDEX(unsigned char cardNo, unsigned char axis);
void ENC6_DO(unsigned char cardNo, unsigned char value);

2.3 FUNCTIONS

2.3.1   ENC6_REGISTRATION

- **Description:**

  To select the hardware address of board and check whether the PISO-Encoder card exists or not.

- **Syntax:**

  int ENC6_REGISTRATION(unsigned char cardNo, unsigned int address, int dev_file_para)

- **Parameter:**

  cardNo : card number 0~15.

  address : select the address based on the hardware address setting on the board.

  dev_file_para : select device file name parameters.

- **Return:**

  Please refer to "Section 2.1 Error Code.

2.3.2　ENC6_INIT_CARD

- **Description:**

  To initialize PISO Encoder card's control registers and set all encoder counters.

- **Syntax:**

  void ENC6_INIT_CARD(unsigned char cardNo, unsigned char x1_mode, unsigned char x2_mode, unsigned char x3_mode, unsigned char x4_mode, unsigned char x5_mode, unsigned char x6_mode)

- **Parameter:**

  cardNo : card number 0~15.

  x1_mode: The value of X1-axis control register;

  x2_mode: The value of X2-axis control register;

  x3_mode: The value of X3-axis control register;

  x4_mode: The value of X4-axis control register;

  x5_mode: The value of X5-axis control register;

  x6_mode: The value of X6-axis control register;

- **Return:**

  None

2.3.3   ENC6_CONFIG

- **Description:**

  This command can only configure hardware reset (HRRST) and encoder index reset (CRST) mode for all of encoder channels. It is useful for user to enable the hardware reset or index reset within program.

- **Syntax:**

  void ENC6_CONFIG(unsigned char cardNo, unsigned char x1_mode, unsigned char x2_mode, unsigned char x3_mode, unsigned char x4_mode, unsigned char x5_mode, unsigned char x6_mode)

- **Parameter:**

  cardNo : card number 0~15.

  x1_mode: The value of X1-axis control register;

  x2_mode: The value of X2-axis control register;

  x3_mode: The value of X3-axis control register;

  x4_mode: The value of X4-axis control register;

  x5_mode: The value of X5-axis control register;

  x6_mode: The value of X6-axis control register;

- **Return:**

  None

2.3.4   ENC6_GET_ENCODER

- **Description :**

    This command reads the assigned axis's encoder counter value.

- **Syntax :**

    unsigned long ENC6_GET_ENCODER(unsigned char cardNo, unsigned char axis)

- **Parameter :**

    cardNo : card number 0~15.

    axis : 1~6.

- **Return:**

    The encoder value.

2.3.5　ENC6_RESET_ENCODER

- **Description :**

  To reset the assigned axis's encoder counter value.

- **Syntax :**

  void ENC6_RESET_ENCODER(unsigned char cardNo, unsigned char axis)

- **Parameter :**

  cardNo : card number 0~15.

  axis : 1~6.

- **Return:**

  None

2.3.6   ENC6_GET_INDEX

- **Description :**

  To get the assigned axis's input register. The contents of input register, C1 (index), HR1 (hardware reset) can be obtained using this command.

- **Syntax :**

  unsigned char ENC6_GET_INDEX(unsigned char cardNo, unsigned char axis)

- **Parameter :**

  cardNo : card number 0~15.

  axis : 1~6.

- **Return:**

  Return the value of RD11 (RD21, RD31, RD41, RD51, RD61) input register.

2.3.7   ENC6_DO

- **Description :**

  To output value to the DO1~DO8.

- **Syntax :**

  void ENC6_DO(unsigned char cardNo, unsigned char value)

- **Parameter :**

  cardNo : card number 0~15.

  value : output value.

- **Return:**

  None

3. PISO-Encoder600/Encoder300 Demo For Linux

All of demo programs will not work normally if PIO/PISO linux driver would not be installed correctly. During the installation process of PIO/PISO linux driver, the install-scripts "ixpio.inst" will setup the correct kernel driver. After driver (version 0.22.9 or the later driver version) compiled and installation, the related demo programs, development library and declaration header files for different development environments are presented as follows.

Table 3.1

Driver Name	Directory Path	File Name	Description
ixpio-0.22.9	Include	msw_enc600.h	Encoder library header
	lib	libenc600.a	Encoder static library
	examples/pisoenc600 examples/pisoenc300	demo.c	Encoder Demo

3.1 Demo code "demo.c"

This demo program is used to read 6/3 axis's encoder counter. Please refer to figure 3-1.

```
[root@localhost pisoenc600]# ./demo
Left:f, Top:13
Press <enter> to next, <Esc> to exit
Left:f, Top:9
  X1 :                 0    HR,INDEX:0
Left:f, Top:a
  X2 :                 0    HR,INDEX:0
Left:f, Top:b
  X3 :                 0    HR,INDEX:0
Left:f, Top:c
  X4 :                 0    HR,INDEX:0
Left:f, Top:d
  X5 :                 0    HR,INDEX:0
Left:f, Top:e
  X6 :                 0    HR,INDEX:0

Left:f, Top:9
  X1 :               852    HR,INDEX:0
Left:f, Top:a
  X2 :                 0    HR,INDEX:0
Left:f, Top:b
  X3 :                 0    HR,INDEX:0
Left:f, Top:c
  X4 :                 0    HR,INDEX:0
Left:f, Top:d
  X5 :                 0    HR,INDEX:0
Left:f, Top:e
  X6 :                 0    HR,INDEX:0
```

Figure 3-1