xpad - Linux USB driver for Xbox compatible controllers

This driver exposes all first-party and third-party Xbox compatible controllers. It has a long history and has enjoyed considerable usage as Window's xinput library caused most PC games to focus on Xbox controller compatibility.

Due to backwards compatibility all buttons are reported as digital. This only effects Original Xbox controllers. All later controller models have only digital face buttons.

Rumble is supported on some models of Xbox 360 controllers but not of Original Xbox controllers nor on Xbox One controllers. As of writing the Xbox One's rumble protocol has not been reverse engineered but in the future could be supported.

Notes

The number of buttons/axes reported varies based on 3 things:

- if you are using a known controller
- if you are using a known dance pad
- if using an unknown device (one not listed below), what you set in the module configuration for "Map D-PAD to buttons rather than axes for unknown pads" (module option dpad_to_buttons)

If you set dpad_to_buttons to N and you are using an unknown device the driver will map the directional pad to axes (X/Y). If you said Y it will map the d-pad to buttons, which is needed for dance style games to function correctly. The default is Y.

dpad_to_buttons has no effect for known pads. A erroneous commit message claimed dpad_to_buttons could be used to force behavior on known devices. This is not true. Both dpad_to_buttons and triggers_to_buttons only affect unknown controllers.

Normal Controllers

With a normal controller, the directional pad is mapped to its own X/Y axes. The jstest-program from joystick-1.2.15 (jstest-version 2.1.0) will report 8 axes and 10 buttons.

All 8 axes work, though they all have the same range (-32768..32767) and the zero-setting is not correct for the triggers (I don't know if that is some limitation of jstest, since the input device setup should be fine. I didn't have a look at jstest itself yet).

All of the 10 buttons work (in digital mode). The six buttons on the right side (A, B, X, Y, black, white) are said to be "analog" and report their values as 8 bit unsigned, not sure what this is good for.

I tested the controller with quake3, and configuration and in game functionality were OK. However, I find it rather difficult to play first person shooters with a pad. Your mileage may vary.

Xbox Dance Pads

When using a known dance pad, jstest will report 6 axes and 14 buttons.

For dance style pads (like the redoctane pad) several changes have been made. The old driver would map the d-pad to axes, resulting in the driver being unable to report when the user was pressing both left+right or up+down, making DDR style games unplayable.

Known dance pads automatically map the d-pad to buttons and will work correctly out of the box.

If your dance pad is recognized by the driver but is using axes instead of buttons, see section 0.3 - Unknown Controllers

I've tested this with Stepmania, and it works quite well.

Unknown Controllers

If you have an unknown xbox controller, it should work just fine with the default settings.

HOWEVER if you have an unknown dance pad not listed below, it will not work UNLESS you set "dpad_to_buttons" to 1 in the module configuration.

USB adapters

All generations of Xbox controllers speak USB over the wire.

- Original Xbox controllers use a proprietary connector and require adapters.
- Wireless Xbox 360 controllers require a 'Xbox 360 Wireless Gaming Receiver for Windows'
- Wired Xbox 360 controllers use standard USB connectors.
- Xbox One controllers can be wireless but speak Wi-Fi Direct and are not yet supported.
- Xbox One controllers can be wired and use standard Micro-USB connectors.

Original Xbox USB adapters

Using this driver with an Original Xbox controller requires an adapter cable to break out the proprietary connector's pins to USB. You can buy these online fairly cheap, or build your own.

Such a cable is pretty easy to build. The Controller itself is a USB compound device (a hub with three ports for two expansion slots and the controller device) with the only difference in a nonstandard connector (5 pins vs. 4 on standard USB 1.0 connectors).

You just need to solder a USB connector onto the cable and keep the yellow wire unconnected. The other pins have the same order on both connectors so there is no magic to it. Detailed info on these matters can be found on the net ([1], [2], [3]).

Thanks to the trip splitter found on the cable you don't even need to cut the original one. You can buy an extension cable and cut that instead. That way, you can still use the controller with your X-Box, if you have one ;)

Driver Installation

Once you have the adapter cable, if needed, and the controller connected the xpad module should be auto loaded. To confirm you can cat /sys/kernel/debug/usb/devices. There should be an entry like those:

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\input\devices\(linux-master)(Documentation)(input)(devices)xpad.rst, line 137)

Error in "code-block" directive: unknown option: "caption".

```
.. code-block:: none
   :caption: dump from InterAct PowerPad Pro (Germany)

    T:  Bus=01 Lev=03 Prnt=04 Port=00 Cnt=01 Dev#=  5 Spd=12  MxCh= 0
    D:  Ver= 1.10 Cls=00(>ifc ) Sub=00 Prot=00 MxPS=32 #Cfgs=  1
    P:  Vendor=05fd ProdID=107a Rev= 1.00
    C:* #Ifs= 1 Cfg#= 1 Atr=80 MxPwr=100mA
    I:  If#= 0 Alt= 0 #EPs= 2 Cls=58(unk. ) Sub=42 Prot=00 Driver=(none)
    E:  Ad=81(I) Atr=03(Int.) MxPS=  32 Ivl= 10ms
    E:  Ad=02(O) Atr=03(Int.) MxPS=  32 Ivl= 10ms
```

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\input\devices\(linux-master)(Documentation)(input)(devices)xpad.rst, line 148)

Error in "code-block" directive: unknown option: "caption".

```
.. code-block:: none
   :caption: dump from Redoctane Xbox Dance Pad (US)

    T:  Bus=01 Lev=02 Prnt=09 Port=00 Cnt=01 Dev#= 10 Spd=12  MxCh= 0
    D:  Ver= 1.10 Cls=00(>ifc ) Sub=00 Prot=00 MxPS= 8 #Cfgs=  1
    P:  Vendor=0c12 ProdID=8809 Rev= 0.01
    S:  Product=XBOX DDR
    C:* #Ifs= 1 Cfg#= 1 Atr=80 MxPwr=100mA
    I:  If#= 0 Alt= 0 #EPs= 2 Cls=58(unk. ) Sub=42 Prot=00 Driver=xpad
    E:  Ad=82(I) Atr=03(Int.) MxPS=  32 Ivl=4ms
    E:  Ad=02(O) Atr=03(Int.) MxPS=  32 Ivl=4ms
```

Supported Controllers

For a full list of supported controllers and associated vendor and product IDs see the xpad_device[] array[4].

As of the historic version 0.0.6 (2006-10-10) the following devices were supported:

```
original Microsoft XBOX controller (US),     vendor=0x045e, product=0x0202
smaller  Microsoft XBOX controller (US),     vendor=0x045e, product=0x0289
original Microsoft XBOX controller (Japan), vendor=0x045e, product=0x0285
InterAct PowerPad Pro (Germany),             vendor=0x05fd, product=0x107a
RedOctane Xbox Dance Pad (US),               vendor=0x0c12, product=0x8809
```

Unrecognized models of Xbox controllers should function as Generic Xbox controllers. Unrecognized Dance Pad controllers require setting the module option 'dpad_to_buttons'.

If you have an unrecognized controller please see 0.3 - Unknown Controllers

Manual Testing

To test this driver's functionality you may use 'jstest'.

For example:

```
> modprobe xpad
> modprobe joydev
> jstest /dev/js0
```

If you're using a normal controller, there should be a single line showing 18 inputs (8 axes, 10 buttons), and its values should change if you move the sticks and push the buttons. If you're using a dance pad, it should show 20 inputs (6 axes, 14 buttons).

It works? Voila, you're done ;)

Thanks

I have to thank ITO Takayuki for the detailed info on his site
http://euc.jp/periphs/xbox-controller.ja.html.

His useful info and both the usb-skeleton as well as the iforce input driver (Greg Kroah-Hartmann; Vojtech Pavlik) helped a lot in rapid prototyping the basic functionality.

References

[1] http://euc.jp/periphs/xbox-controller.ja.html (ITO Takayuki)

[2] http://xpad.xbox-scene.com/

[3] http://www.markosweb.com/www/xboxhackz.com/

[4] https://elixir.bootlin.com/linux/latest/ident/xpad_device

Historic Edits

2002-07-16 - Marko Friedemann <mfr@bmx-chemnitz.de>
- original doc

2005-03-19 - Dominic Cerquetti <binary1230@yahoo.com>
- added stuff for dance pads, new d-pad->axes mappings

Later changes may be viewed with 'git log --follow Documentation/input/devices/xpad.rst'