Kernel driver lis3lv02d

Supported chips:

- STMicroelectronics LIS3LV02DL, LIS3LV02DQ (12 bits precision)
- STMicroelectronics LIS302DL, LIS3L02DQ, LIS331DL (8 bits) and LIS331DLH (16 bits)

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Description

This driver provides support for the accelerometer found in various HP laptops sporting the feature officially called "HP Mobile Data Protection System 3D" or "HP 3D DriveGuard". It detects automatically laptops with this sensor. Known models (full list can be found in drivers/platform/x86/hp_accel.c) will have their axis automatically oriented on standard way (eg: you can directly play neverball). The accelerometer data is readable via /sys/devices/platform/lis3lv02d. Reported values are scaled to mg values (1/1000th of earth gravity).

Sysfs attributes under /sys/devices/platform/lis3lv02d/:

position
- 3D position that the accelerometer reports. Format: "(x,y,z)"

rate
- read reports the sampling rate of the accelerometer device in HZ. write changes sampling rate of the accelerometer device. Only values which are supported by HW are accepted.

selftest
- performs selftest for the chip as specified by chip manufacturer.

This driver also provides an absolute input class device, allowing the laptop to act as a pinball machine-esque joystick. Joystick device can be calibrated. Joystick device can be in two different modes. By default output values are scaled between -32768 .. 32767. In joystick raw mode, joystick and sysfs position entry have the same scale. There can be small difference due to input system fuzziness feature. Events are also available as input event device.

Selftest is meant only for hardware diagnostic purposes. It is not meant to be used during normal operations. Position data is not corrupted during selftest but interrupt behaviour is not guaranteed to work reliably. In test mode, the sensing element is internally moved little bit. Selftest measures difference between normal mode and test mode. Chip specifications tell the acceptance limit for each type of the chip. Limits are provided via platform data to allow adjustment of the limits without a change to the actual driver. Seltest returns either "OK x y z" or "FAIL x y z" where x, y and z are measured difference between modes. Axes are not remapped in selftest mode. Measurement values are provided to help HW diagnostic applications to make final decision.

On HP laptops, if the led infrastructure is activated, support for a led indicating disk protection will be provided as /sys/class/leds/hp::hddprotect.

Another feature of the driver is misc device called "freefall" that acts similar to /dev/rtc and reacts on free-fall interrupts received from the device. It supports blocking operations, poll/select and fasync operation modes. You must read 1 bytes from the device. The result is number of free-fall interrupts since the last successful read (or 255 if number of interrupts would not fit). See the freefall.c file for an example on using the device.

Axes orientation

For better compatibility between the various laptops. The values reported by the accelerometer are converted into a "standard" organisation of the axes (aka "can play neverball out of the box"):

- When the laptop is horizontal the position reported is about 0 for X and Y and a positive value for Z
- If the left side is elevated, X increases (becomes positive)
- If the front side (where the touchpad is) is elevated, Y decreases (becomes negative)
- If the laptop is put upside-down, Z becomes negative

If your laptop model is not recognized (cf "dmesg"), you can send an email to the maintainer to add it to the database. When reporting a new laptop, please include the output of "dmidecode" plus the value of /sys/devices/platform/lis3lv02d/position in these four cases.

Q&A

Q: How do I safely simulate freefall? I have an HP "portable workstation" which has about 3.5kg and a plastic case, so letting it fall to the ground is out of question...

A: The sensor is pretty sensitive, so your hands can do it. Lift it into free space, follow the fall with your hands for like 10 centimeters. That should be enough to trigger the detection.