

# Hardware GPIO-IRQ

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**ODROID-C1** supports the GPIO interrupt of Edge trigger.

The maximum number of interrupt is limited to 8 when you use the falling(Low) or rising(High) edge trigger.

If you use the Both (rising and falling together) edge triggers, the maximum number is only **4**.

**Micro-SD card is using the both rising and falling for card detection, the actual available IRQ is only 6(or 3).**

You must use the **Linux 3.10.96-149 Apr** or higher to use the GPIO interrupt in the user-land.

## Usage

To use the GPIO Interrupt in the User space, you must export the GPIO and add the Trigger option in Edge parameter.

### GPIO Export

```
echo [GPIO Number(Refer expansion\_connectors )] > /sys/class/gpio/export
```

e.g) GPIOY.BIT3 Export (Pin Number 7)

```
echo 83 > /sys/class/gpio/export
```

### User Space Example code

This C example code shows the status of GPIO interrupts in the User Space.  
This example uses Both(rising + falling) edges on the GPIO Pin 7.

### Build

```
gcc -o aml_gpio_irq_test aml_gpio_irq_test.c
```

### Run

“Usage: aml\_gpio\_irq [GPIO Number]”

```
sudo aml_gpio_irq_test 83
```

**Code**[aml\\_gpio\\_irq.c](#)

```
//[*]-----  
-----[*]  
//  
//  GPIO IRQ Test Application for AMLogic.  
//  
//[*]-----  
-----[*]  
#include <stdio.h>  
#include <stdlib.h>  
#include <string.h>  
#include <errno.h>  
#include <unistd.h>  
#include <fcntl.h>  
#include <poll.h>  
#include <sched.h>  
  
//[*]-----  
-----[*]  
#define SYSFS_GPIO_DIR  "/sys/class/gpio"  
#define POLL_TIMEOUT    (3 * 1000) /* 3 seconds */  
#define MAX_BUF        64  
  
//[*]-----  
-----[*]  
int gpio_export(unsigned int gpio)  
{  
    int fd, len;  
    char buf[MAX_BUF];  
  
    fd = open(SYSFS_GPIO_DIR "/export", O_WRONLY);  
    if (fd < 0) {  
        perror("gpio/export");  
        return fd;  
    }  
  
    len = snprintf(buf, sizeof(buf), "%d", gpio);  
    write(fd, buf, len);  
    close(fd);  
  
    return 0;  
}  
  
//[*]-----  
-----[*]  
int gpio_unexport(unsigned int gpio)  
{
```

```

int fd, len;
char buf[MAX_BUF];

fd = open(SYSFS_GPIO_DIR "/unexport", O_WRONLY);
if (fd < 0) {
    perror("gpio/export");
    return fd;
}

len = snprintf(buf, sizeof(buf), "%d", gpio);
write(fd, buf, len);
close(fd);
return 0;
}

//[*]-----
-----[*]
int gpio_set_dir(unsigned int gpio, unsigned int out_flag)
{
    int fd, len;
    char buf[MAX_BUF];

    len = snprintf(buf, sizeof(buf), SYSFS_GPIO_DIR
"/gpio%d/direction", gpio);

    fd = open(buf, O_WRONLY);
    if (fd < 0) {
        perror("gpio/direction");
        return fd;
    }

    if (out_flag)
        write(fd, "out", 4);
    else
        write(fd, "in", 3);

    close(fd);
    return 0;
}

//[*]-----
-----[*]
int gpio_set_value(unsigned int gpio, unsigned int value)
{
    int fd, len;
    char buf[MAX_BUF];

    len = snprintf(buf, sizeof(buf), SYSFS_GPIO_DIR "/gpio%d/value",
gpio);

    fd = open(buf, O_WRONLY);

```

```
    if (fd < 0) {
        perror("gpio/set-value");
        return fd;
    }

    if (value)
        write(fd, "1", 2);
    else
        write(fd, "0", 2);

    close(fd);
    return 0;
}

//[*]-----
-----[*]
int gpio_get_value(unsigned int gpio, unsigned int *value)
{
    int fd, len;
    char buf[MAX_BUF];
    char ch;

    len = snprintf(buf, sizeof(buf), SYSFS_GPIO_DIR "/gpio%d/value",
gpio);

    fd = open(buf, O_RDONLY);
    if (fd < 0) {
        perror("gpio/get-value");
        return fd;
    }

    read(fd, &ch, 1);

    if (ch != '0') {
        *value = 1;
    } else {
        *value = 0;
    }

    close(fd);
    return 0;
}

//[*]-----
-----[*]
int gpio_set_edge(unsigned int gpio, char *edge)
{
    int fd, len;
    char buf[MAX_BUF];

    len = snprintf(buf, sizeof(buf), SYSFS_GPIO_DIR "/gpio%d/edge",
```

```

gpio);

    fd = open(buf, O_WRONLY);
    if (fd < 0) {
        perror("gpio/set-edge");
        return fd;
    }

    write(fd, edge, strlen(edge) + 1);
    close(fd);
    return 0;
}

//[*]-----
-----[*]
int gpio_fd_open(unsigned int gpio)
{
    int fd, len;
    char buf[MAX_BUF];

    len = snprintf(buf, sizeof(buf), SYSFS_GPIO_DIR "/gpio%d/value",
gpio);

    fd = open(buf, O_RDONLY | O_NONBLOCK );
    if (fd < 0) {
        perror("gpio/fd_open");
    }
    return fd;
}

//[*]-----
-----[*]
int gpio_fd_close(int fd)
{
    return close(fd);
}

//[*]-----
-----[*]
int main(int argc, char **argv, char **envp)
{
    struct pollfd fdset[2];
    int nfds = 2;
    int gpio_fd, timeout, rc;
    char *buf[MAX_BUF];
    unsigned int gpio;
    int len;

    if (argc < 2) {
        printf("Usage: aml_gpio_irq <gpio_pin>\n\n");
        printf("Waits for a change in the GPIO pin voltage level or

```

```
input on stdin\n");
    exit(-1);
}

gpio = atoi(argv[1]);

gpio_export(gpio);
gpio_set_dir(gpio, 0);
gpio_set_edge(gpio, "both"); // High/Low Edge Trigger
gpio_fd = gpio_fd_open(gpio);

timeout = POLL_TIMEOUT;

// set a high priority scheduling for the running program
{
    struct sched_param sched ;

    memset (&sched, 0, sizeof(sched)) ;

    sched.sched_priority = 55;

    sched_setscheduler (0, SCHED_RR, &sched) ;
}

while (1) {
    memset((void*)fdset, 0, sizeof(fdset));

    fdset[0].fd = STDIN_FILENO;
    fdset[0].events = POLLIN;

    fdset[1].fd = gpio_fd;
    fdset[1].events = POLLPRI;

    rc = poll(fdset, nfds, timeout);

    if (rc < 0) {
        printf("\npoll() failed!\n");
        return -1;
    }

    if (rc == 0) {
        printf("POLL Timeout!\n");
    }

    if (fdset[1].revents & POLLPRI) {
        len = read(fdset[1].fd, buf, MAX_BUF);
        printf("\npoll() GPIO %d interrupt occurred\n", gpio);
    }

    if (fdset[0].revents & POLLIN) {
        (void)read(fdset[0].fd, buf, 1);
    }
}
```

```
        printf("\npoll() stdin read 0x%2.2X\n", (unsigned int)
buf[0]);
    }

    fflush(stdout);
}

gpio_fd_close(gpio_fd);

return 0;
}

//[*]-----
-----[*]
//[*]-----
-----[*]
```

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Last update: **2019/07/09 09:59**

