TI DSP, MCU 및 Xilinx Zynq FPGA 프로그래밍 전문가 과정

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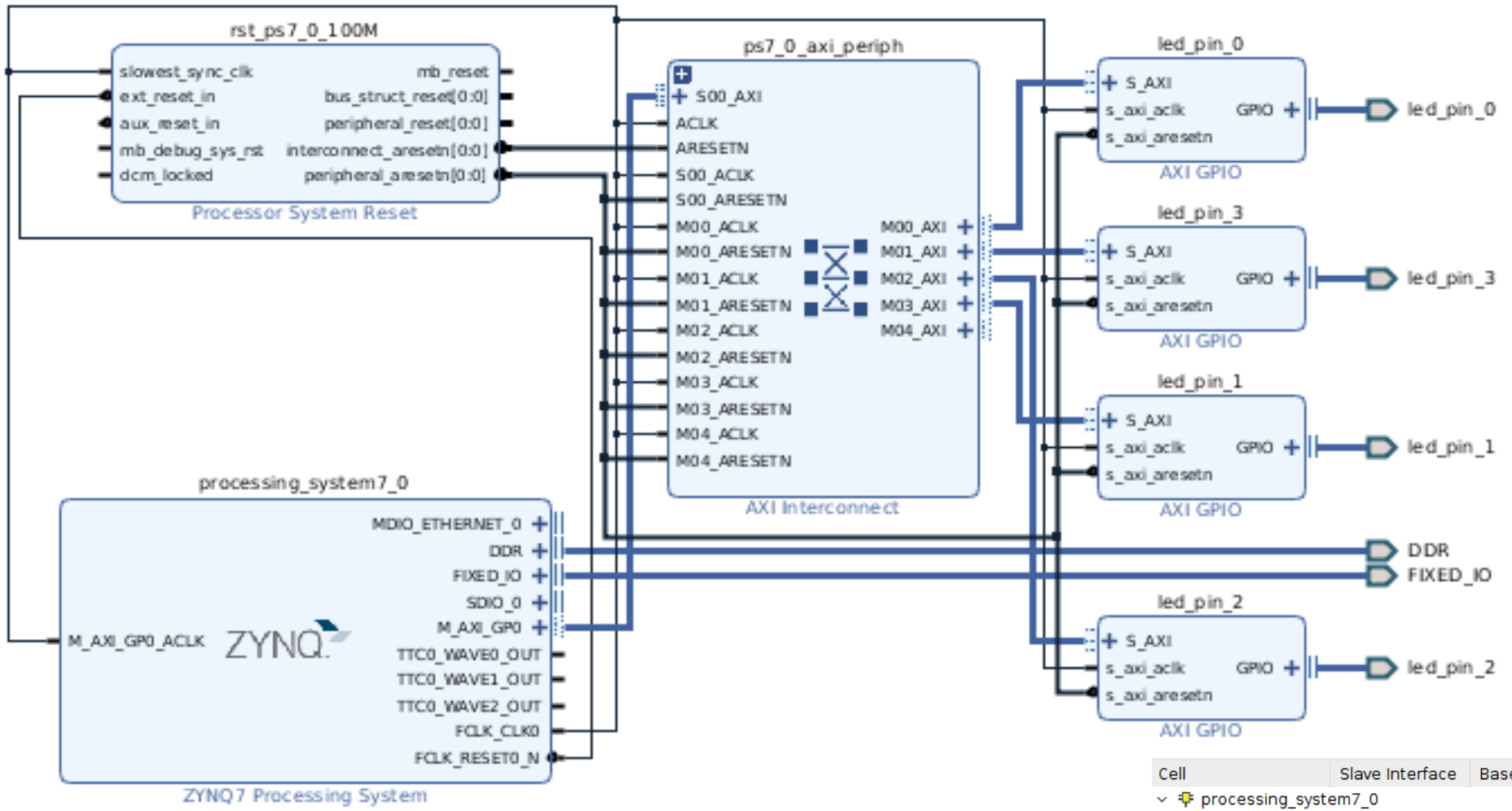
목차

Zynq FPGA on Petalinux for led control

1) vivado_block_design for led



Cell	Slave Interface	Base Name	Offset Address	Range	High Address
processing_system7_0					
Data (32 address bits : 0x40000000 [1G])					
led_pin_0	S_AXI	Reg	0x4120_0000	64K	0x4120_FFFF
led_pin_3	S_AXI	Reg	0x4121_0000	64K	0x4121_FFFF
led_pin_2	S_AXI	Reg	0x4122_0000	64K	0x4122_FFFF
led_pin_1	S_AXI	Reg	0x4123_0000	64K	0x4123_FFFF

2) Device-tree & device_driver_code

device_tree

```
/dts-v1/;
/include/ "system-conf.dtsi"
/ {
};

&clkc {
    ps-clk-frequency = <50000000>;
};
&flash0{
    compatible = "s25fl128s1";
};
&usb0{
    dr_mode = "otg";
};
&gem0{
    phy-handle = <&phy0>;
    mdio{
#address-cells = <1>;
#size-cells = <0>;
            phy0: phy@1{
                compatible = "realtek,RTL8211E";
                device_type = "ethernet-phy";
                reg = <1>;
            };
    };
};
&led_pin_0{
    compatible = "generic-uio";
};
&led_pin_1{
    compatible = "generic-uio";
};
&led_pin_2{
    compatible = "generic-uio";
};
&led_pin_3{
    compatible = "generic-uio";
};

```

device_driver_code

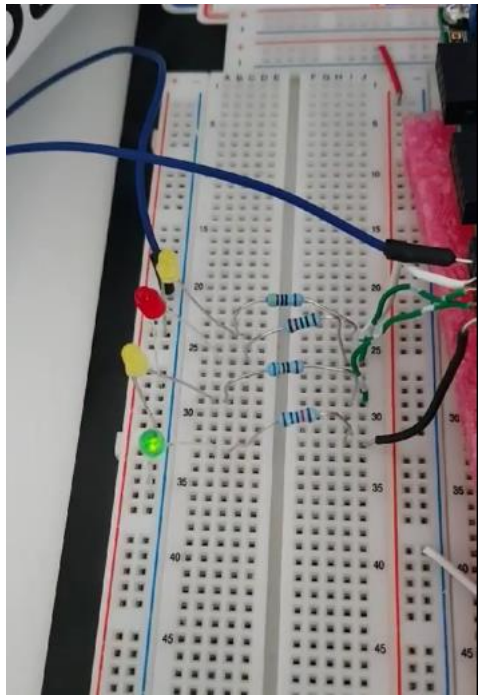
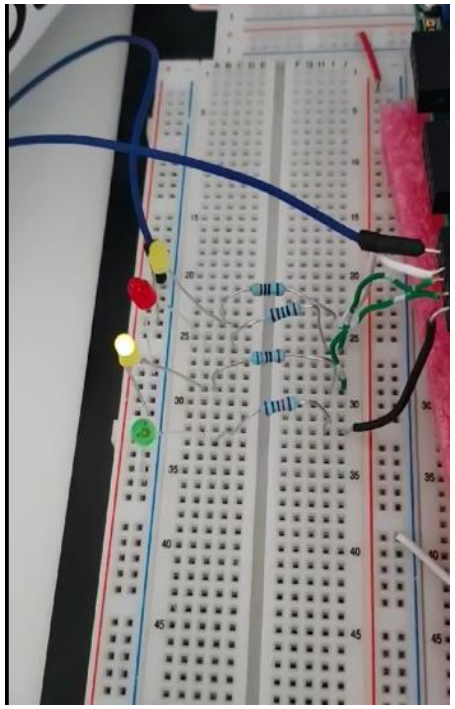
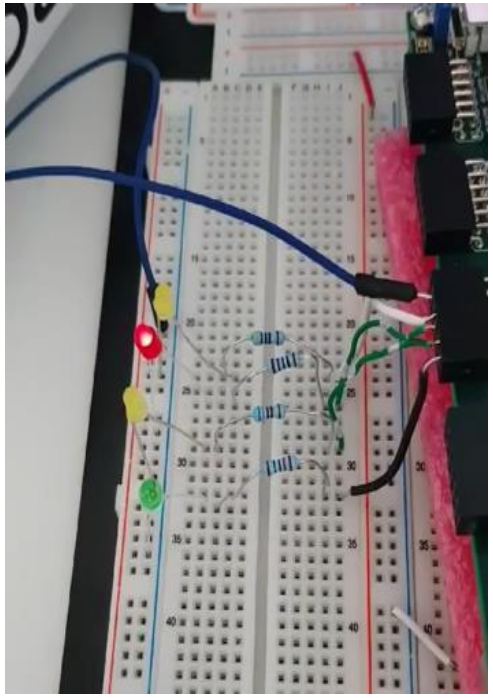
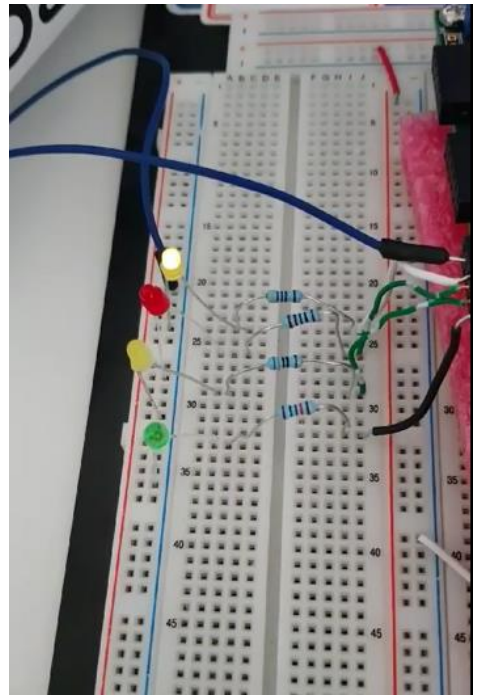
```
#include <stdio.h>
#include <stdlib.h>
#include <unistd.h>
#include <sys/mman.h>
#include <fcntl.h>
#include <signal.h>

#define IN      0
#define OUT     1
#define GPIO_MAP_SIZE       0x10000

#define GPIO_DATA_OFFSET    0x00
#define GPIO_TRI_OFFSET     0x04

char *uiod[5];
void *ptr[5];

void _signal(int signum){

    int i;
    printf("sinal accur!\n");
    for(i=0;ptr[i];i++){
        munmap(ptr[i], GPIO_MAP_SIZE);
    }
    exit(0);
}
void led_on_1(void){
    *((unsigned *)(ptr[0] + GPIO_TRI_OFFSET)) = 0;
    *((unsigned *)(ptr[0] + GPIO_DATA_OFFSET)) = 1;
    sleep(1);
    printf("led_on_1\n");
    *((unsigned *)(ptr[0] + GPIO_DATA_OFFSET)) = 0;
    sleep(1);
}
void led_on_2(void){

    *((unsigned *)(ptr[1] + GPIO_TRI_OFFSET)) = 0;
    *((unsigned *)(ptr[1] + GPIO_DATA_OFFSET)) = 1;
    sleep(1);
    printf("led_on_2\n");
    *((unsigned *)(ptr[1] + GPIO_DATA_OFFSET)) = 0;
    sleep(1);
}
void led_on_3(void){

    *((unsigned *)(ptr[2] + GPIO_TRI_OFFSET)) = 0;
    *((unsigned *)(ptr[2] + GPIO_DATA_OFFSET)) = 1;
    sleep(1);
    printf("led_on_3\n");
    *((unsigned *)(ptr[2] + GPIO_DATA_OFFSET)) = 0;
    sleep(1);
}
void led_on_4(void){
    *((unsigned *)(ptr[3] + GPIO_TRI_OFFSET)) = 0;
    *((unsigned *)(ptr[3] + GPIO_DATA_OFFSET)) = 1;
    sleep(1);
    printf("led_on_4\n");
    *((unsigned *)(ptr[3] + GPIO_DATA_OFFSET)) = 0;
    sleep(1);
}

void usage(void){
    printf("*argv[0] -d <UIO_DEV_FILE> -i | -o <VALUE>\n");
    printf(" -d UIO device file - ex) /dev/uio0");
    printf(" -i Input from GPIO\n");
    printf(" -o <VALUE> Output to GPIO\n");
}

int main(int argc, char *argv[])
{
    int i;
    int c, fd[4], value, direction = IN;
    signal(SIGINT,_signal);

    printf("GPIO UIO Test\n");

    uiod[0] = "/dev/uio0";
    uiod[1] = "/dev/uio1";
    uiod[2] = "/dev/uio2";
    uiod[3] = "/dev/uio3";

    for(i=0;uiod[i];i++){
        fd[i] = open(uiod[i], O_RDWR);
    }

    for(i=0;fd[i];i++){
        ptr[i] = mmap(NULL, GPIO_MAP_SIZE, PROT_READ|PROT_WRITE,MAP_SHARED, fd[i], 0);
    }

    while(1){
        led_on_1();
        led_on_2();
        led_on_3();
        led_on_4();
    }

    return 0;

}
```

3) Led control result

simulation

```
root@kernel:~# device_driver
GPIO UIO Test
led_on_1
led_on_2
led_on_3
led_on_4
led_on_1
led_on_2
led_on_3
led_on_4
led_on_1
led_on_2
led_on_3
led_on_4
led_on_1
led_on_2
led_on_3
led_on_4
led_on_1
led_on_2
led_on_3
led_on_4
led_on_1
led_on_2
led_on_3
led_on_4
led_on_1
led_on_2
led_on_3
led_on_4
led_on_1
led_on_2
^Csinal accur!
```

Led_control

4) tftfboot Error

If you mean this message
[INFO] Failed to copy images to TFTPBOOT /tftpboot
you need to create /tftpboot folder and allow write to this folder to user
sudo mkdir /tftpboot
sudo chmod 777 /tftpboot
It's not a critical error as this folder used only if you using network boot and have configured TFTP server for this folder.

```
/etc/init.d/xinetd restart
```