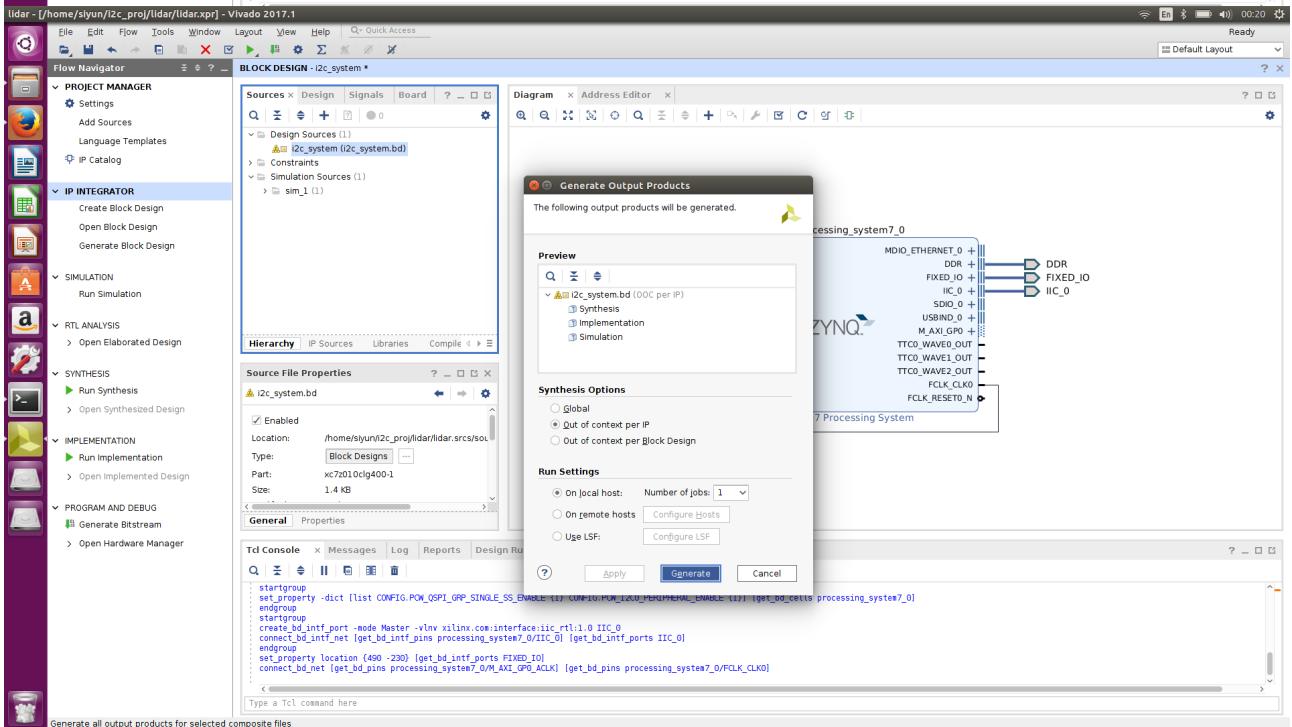
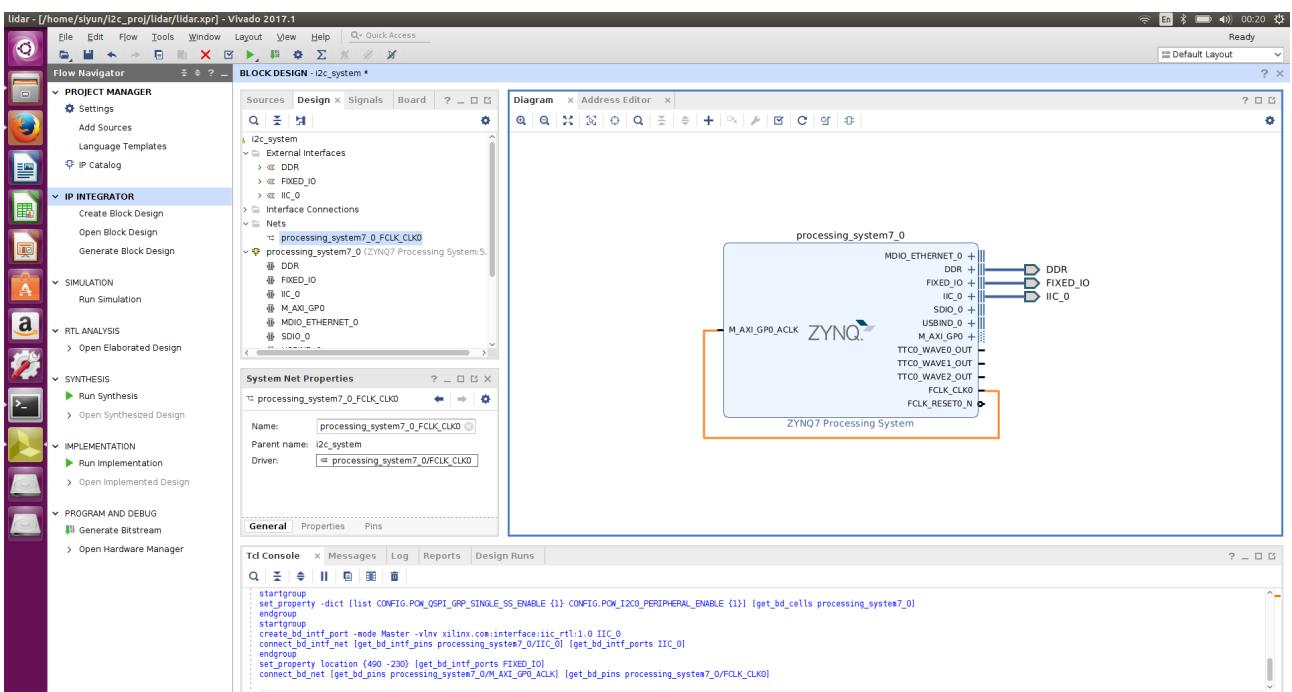
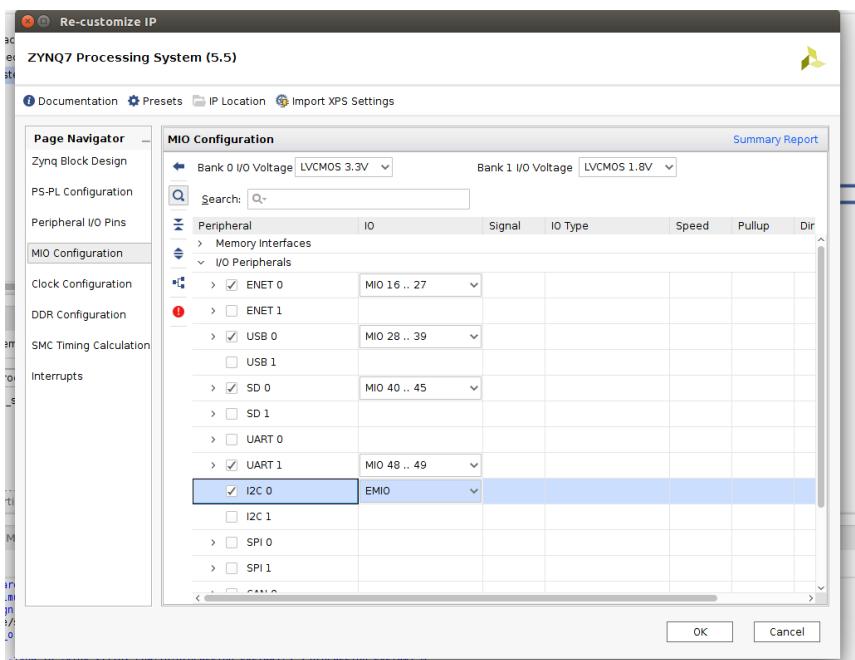
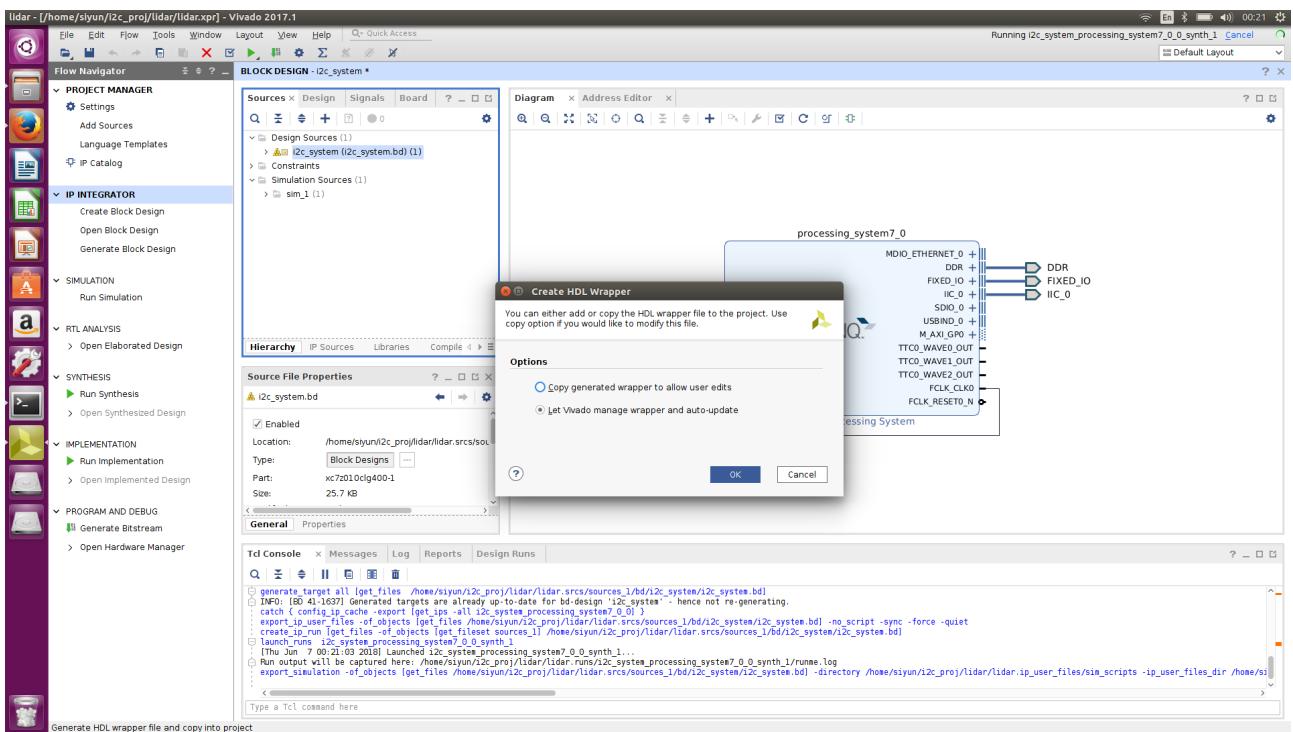


Xilinx Zynq FPGA, TI DSP, MCU 기반의 프로그래밍 및 회로 설계 전문가 과정

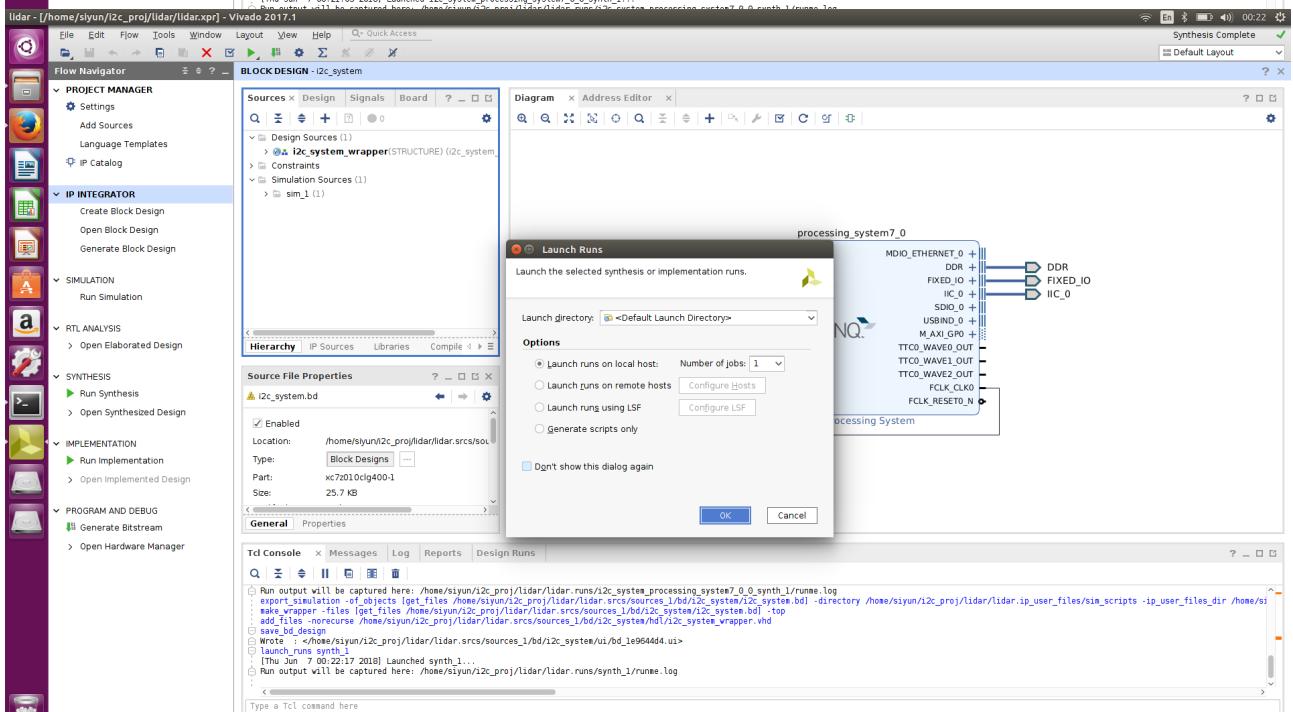
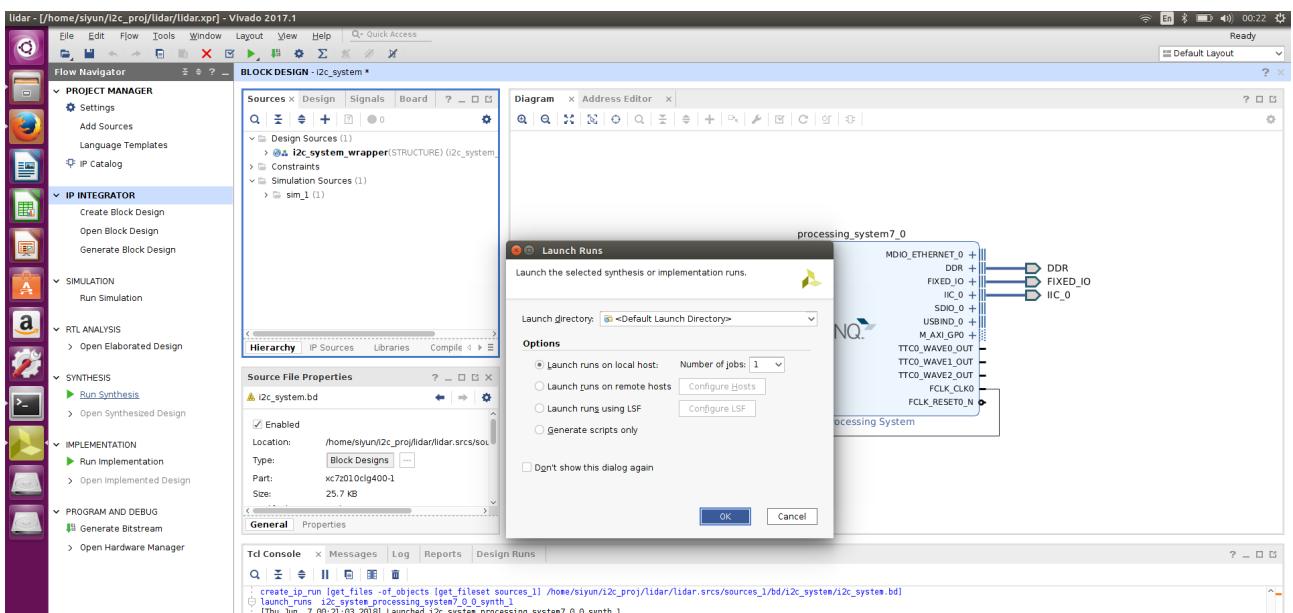
강사 : Innova Lee(이상훈)

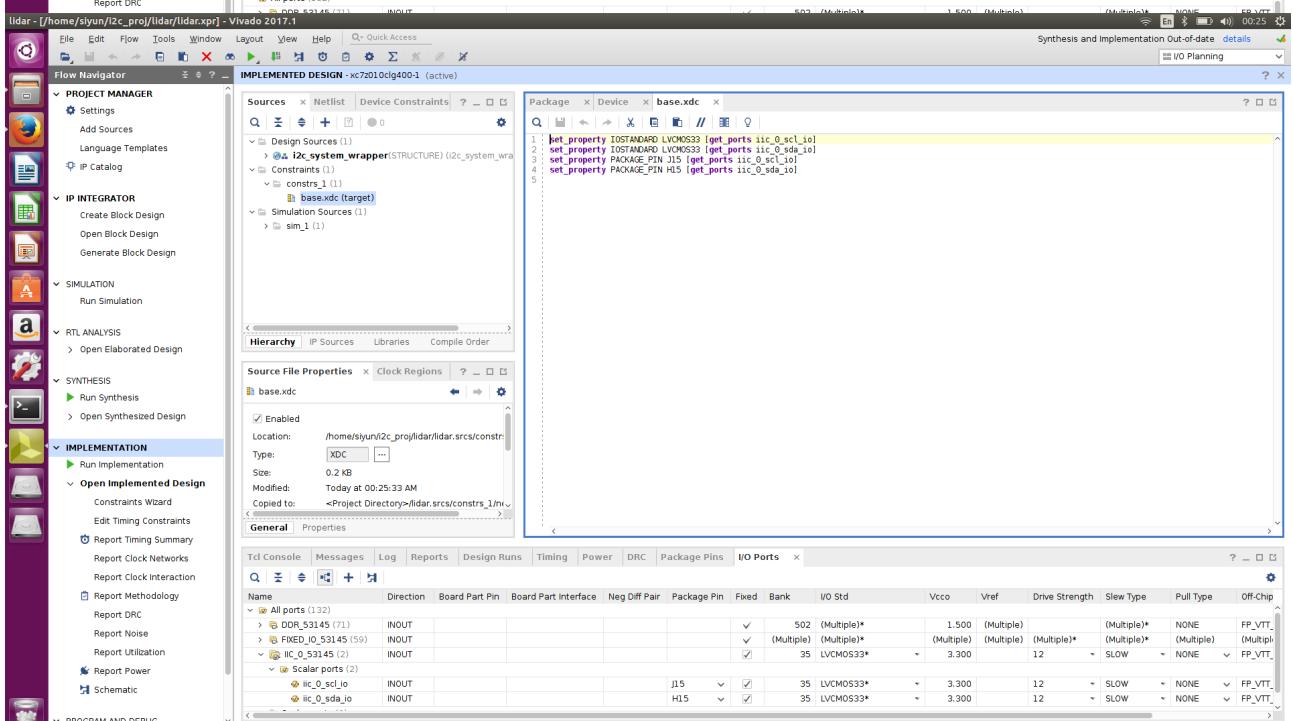
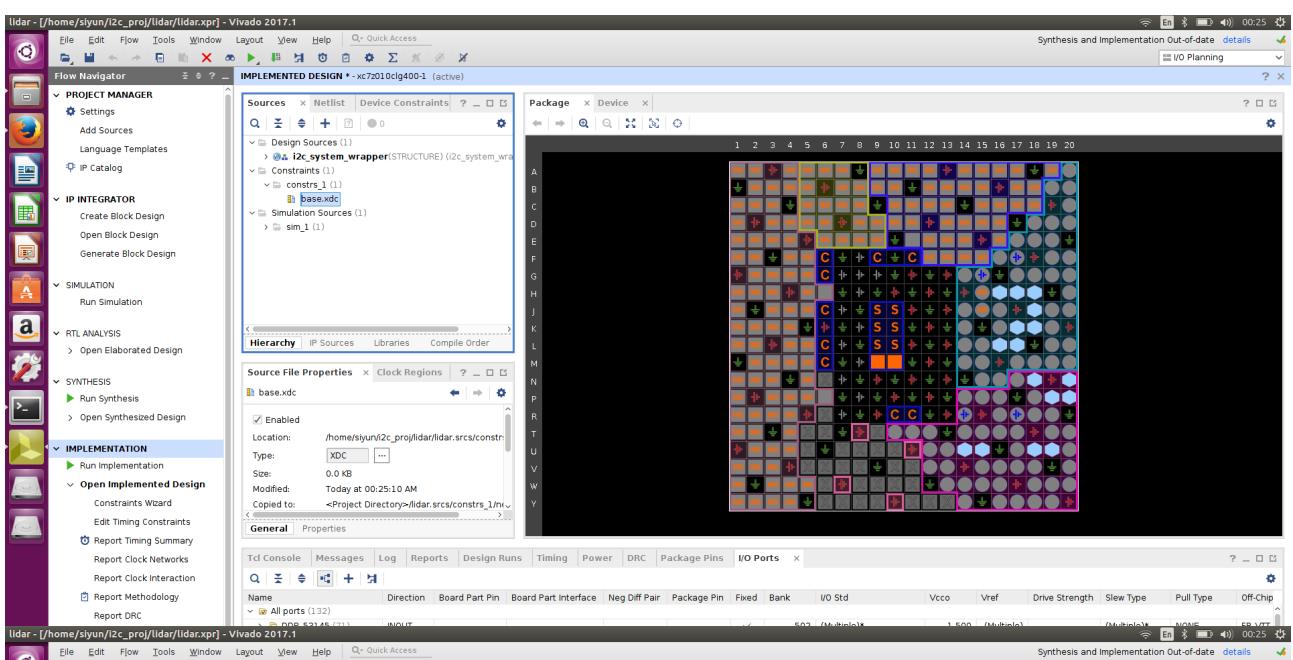
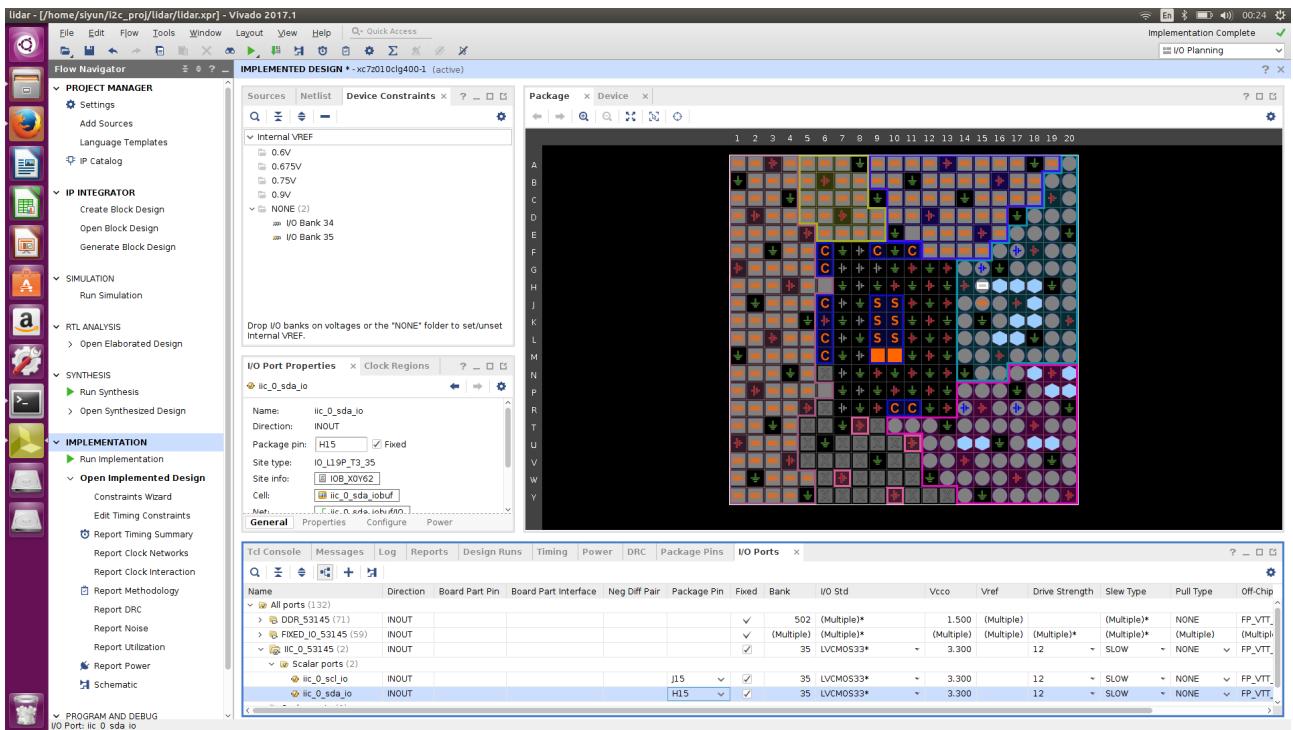
학생 : 김시윤

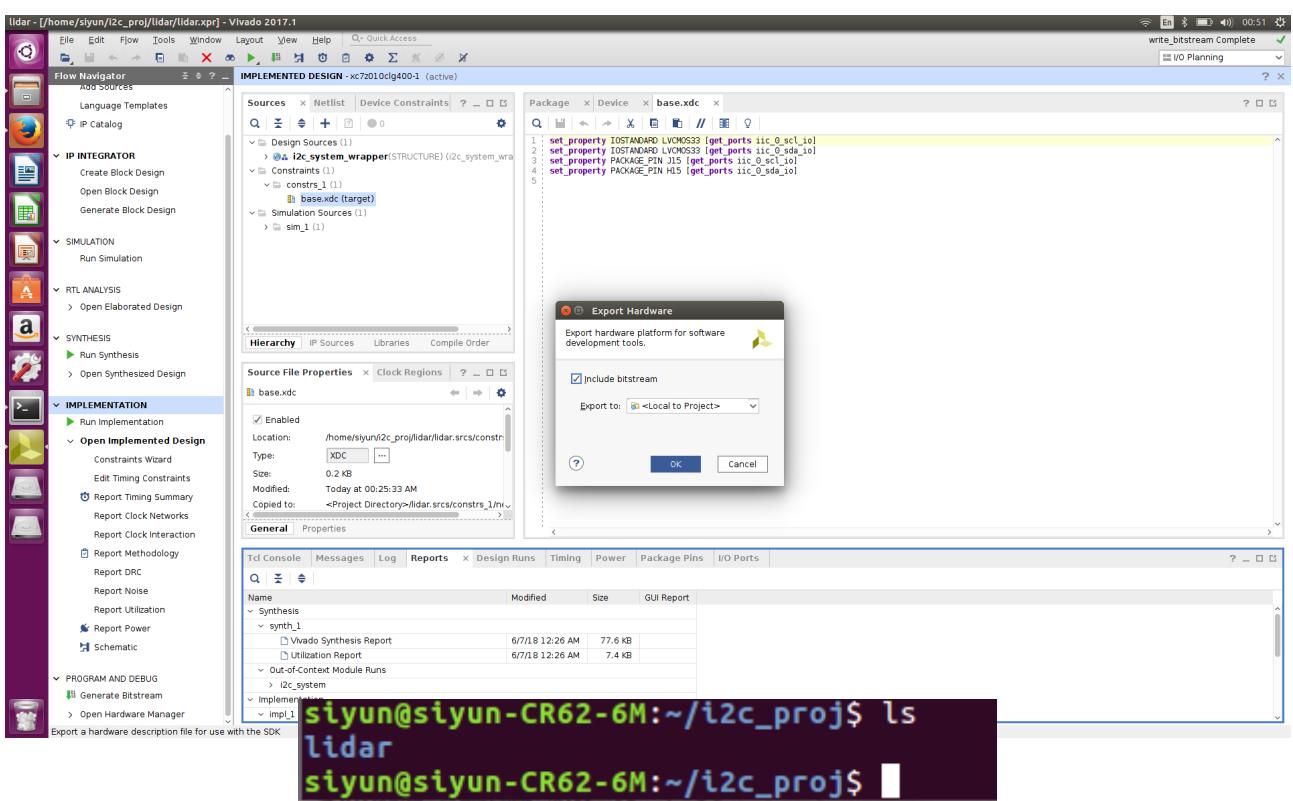
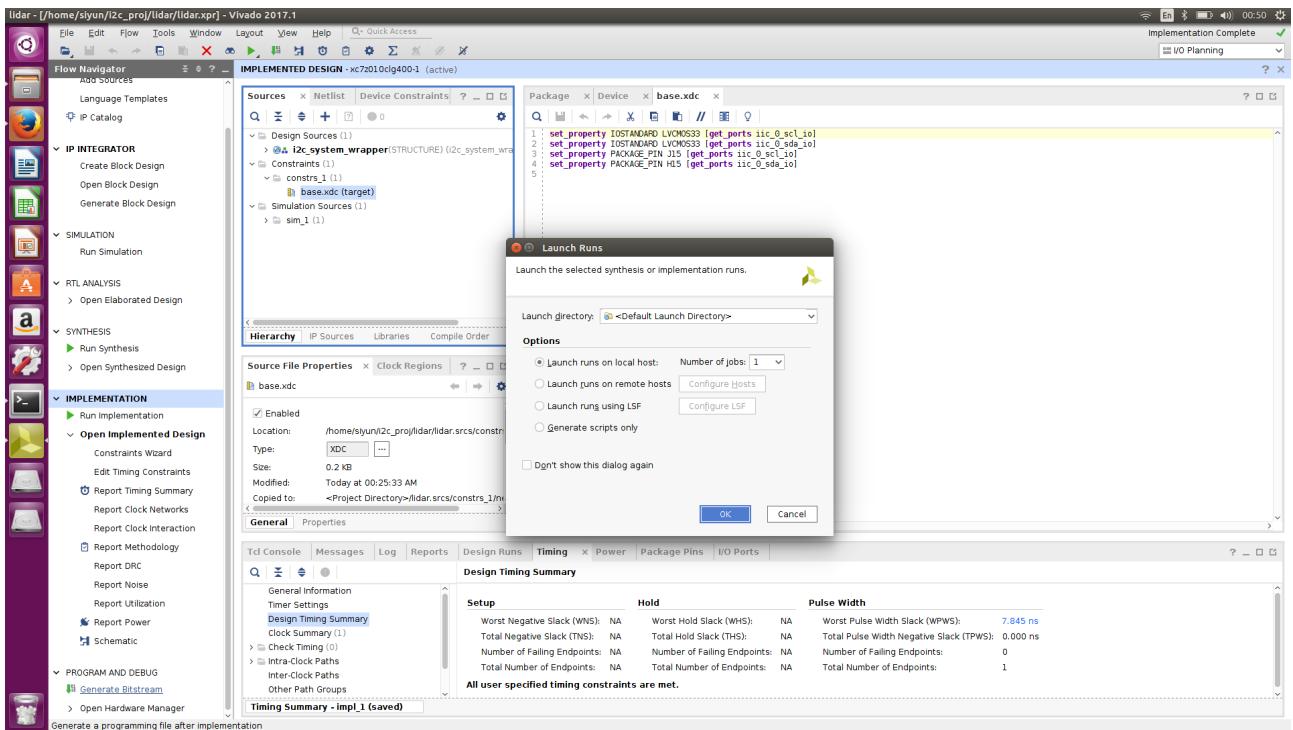




Generate HDL wrapper file and copy into project







```
siyun@siyun-CR62-6M:~/i2c_proj$ ls
lidar PETALINUX
siyun@siyun-CR62-6M:~/i2c_proj$
```

```
siyun@siyun-CR62-6M: ~/i2c_proj/PETALINUX/i2c_lidar
siyun@siyun-CR62-6M:~/xilinx/Vivado/2017.1/bin$ cd ~
siyun@siyun-CR62-6M:~$ ls
Desktop      fpga_test  Music        Public       xilinx
Documents    i2c_proj   my_proj     Templates    xilinx_vivado
Downloads    i2c_proj2  petalinux_zynq Videos
examples.desktop i2c_proj3 Pictures    vivado_workspace
siyun@siyun-CR62-6M:~$ cd i2c_proj
siyun@siyun-CR62-6M:~/i2c_proj$ ls
lidar
siyun@siyun-CR62-6M:~/i2c_proj$ mkdir PETALINUX
siyun@siyun-CR62-6M:~/i2c_proj$ ls
lidar PETALINUX
siyun@siyun-CR62-6M:~/i2c_proj$ cd PETALINUX/
siyun@siyun-CR62-6M:~/i2c_proj/PETALINUX$ petalinux-create -t project -n i2c_lid
ar --template zynq
INFO: Create project: i2c_lidar
INFO: New project successfully created in /home/siyun/i2c_proj/PETALINUX/i2c_lid
ar
siyun@siyun-CR62-6M:~/i2c_proj/PETALINUX$ ls
i2c_lidar
siyun@siyun-CR62-6M:~/i2c_proj/PETALINUX$ cd i2c_lidar/
siyun@siyun-CR62-6M:~/i2c_proj/PETALINUX/i2c_lidar$ ls
config.project hw-description subsystems
siyun@siyun-CR62-6M:~/i2c_proj/PETALINUX/i2c_lidar$
```

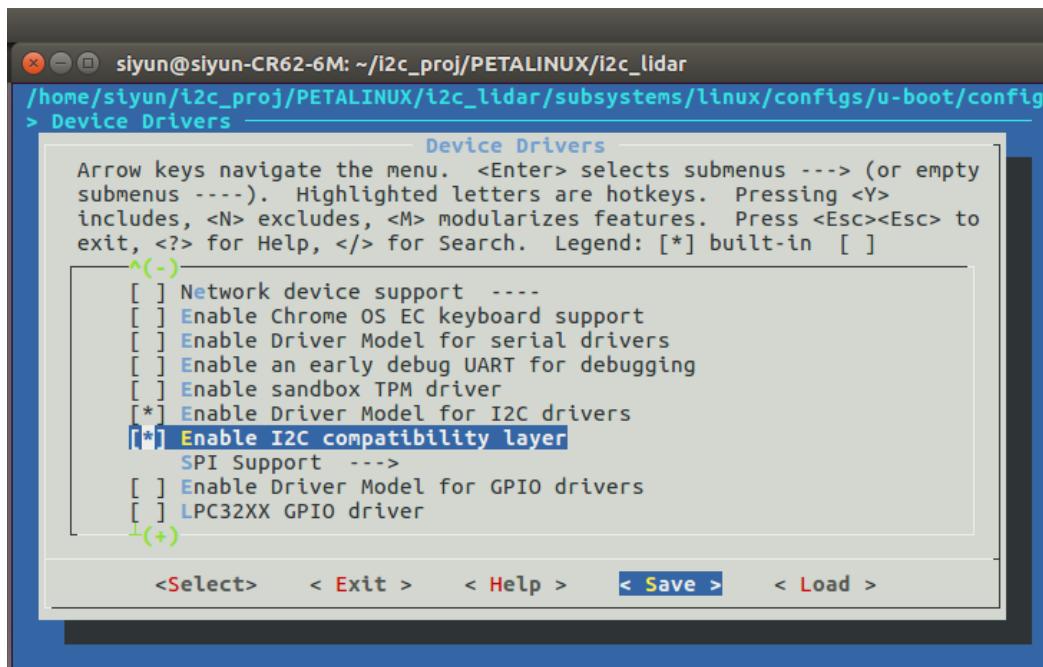
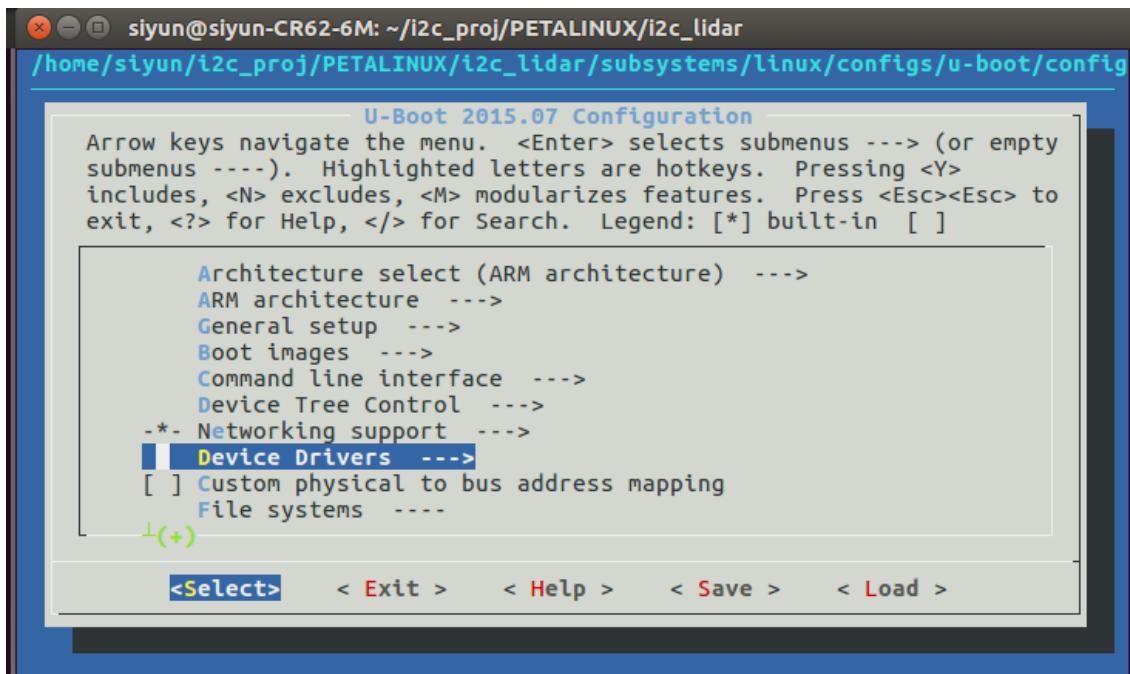
```
siyun-CR62-6M: ~/i2c_proj/PETALINUX/i2c_lidar
Command 'cdi' from package 'cdo' (universe)
Command 'cde' from package 'cde' (universe)
Command 'cdo' from package 'cdo' (universe)
cd: command not found
siyun@siyun-CR62-6M:~/xilinx/Vivado/2017.1/bin$ cd ~
siyun@siyun-CR62-6M:~$ ls
Desktop      fpga_test  Music        Public       xilinx
Documents    i2c_proj   my_proj     Templates    xilinx_vivado
Downloads    i2c_proj2  petalinux_zynq Videos
examples.desktop i2c_proj3 Pictures    vivado_workspace
siyun@siyun-CR62-6M:~$ cd i2c_proj
siyun@siyun-CR62-6M:~/i2c_proj$ ls
lidar
siyun@siyun-CR62-6M:~/i2c_proj$ mkdir PETALINUX
siyun@siyun-CR62-6M:~/i2c_proj$ ls
lidar PETALINUX
siyun@siyun-CR62-6M:~/i2c_proj$ cd PETALINUX/
siyun@siyun-CR62-6M:~/i2c_proj/PETALINUX$ petalinux-create -t project -n i2c_lidar --template zynq
INFO: Create project: i2c_lidar
INFO: New project successfully created in /home/siyun/i2c_proj/PETALINUX/i2c_lidar
siyun@siyun-CR62-6M:~/i2c_proj/PETALINUX$ ls
i2c_lidar
siyun@siyun-CR62-6M:~/i2c_proj/PETALINUX$ cd i2c_lidar/
siyun@siyun-CR62-6M:~/i2c_proj/PETALINUX/i2c_lidar$ ls
config.project hw-description subsystems
siyun@siyun-CR62-6M:~/i2c_proj/PETALINUX/i2c_lidar$ petalinux-config --get-hw-description=/i2c_proj/lidar/lidar.sdk
INFO: Checking component...
INFO: Getting hardware description...
INFO: Rename i2c_system_wrapper.hdf to system.hdf

***** hsi v2015.4 (64-bit)
**** SW Build 1412921 on Wed Nov 18 09:44:32 MST 2015
** Copyright 1986-2015 Xilinx, Inc. All Rights Reserved.

source /home/siyun/i2c_proj/PETALINUX/i2c_lidar/build/linux/hw-description.tcl -notrace
INFO: [Common 17-206] Exiting hsi at Thu Jun 7 00:55:04 2018...
INFO: Config linux
[INFO ] config linux

*** End of the configuration.
*** Execute 'make' to start the build or try 'make help'.

[INFO ] generate DTS to /home/siyun/i2c_proj/PETALINUX/i2c_lidar/subsystems/linux/configs/device-tree
INFO: [Hsi 55-1698] elapsed time for repository loading 0 seconds
WARNING: ps7_ethernet_0: No reset found
WARNING: ps7_i2c_0: No reset found
INFO: [Common 17-206] Exiting hsi at Thu Jun 7 00:55:40 2018...
[INFO ] generate BSP for zynq_fsbl
INFO: [Hsi 55-1698] elapsed time for repository loading 0 seconds
INFO: [Common 17-206] Exiting hsi at Thu Jun 7 00:55:53 2018...
INFO: Config linux/kernel
[INFO ] oldconfig linux/kernel
INFO: Config linux/rootfs
[INFO ] oldconfig linux/rootfs
INFO: Config linux/u-boot
[INFO ] generate linux/u-boot configuration files
[INFO ] generate linux/u-boot board header files
INFO: [Hsi 55-1698] elapsed time for repository loading 0 seconds
INFO: [Common 17-206] Exiting hsi at Thu Jun 7 00:56:02 2018...
[INFO ] oldconfig linux/u-boot
siyun@siyun-CR62-6M:~/i2c_proj/PETALINUX/i2c_lidar$
```



```
siyun@siyun-CR62-6M: ~/i2c_proj/PETALINUX/i2c_lidar
INFO: [Common 17-206] Exiting hsi at Thu Jun  7 00:56:02 2018...
[INFO ] oldconfig linux/u-boot
siyun@siyun-CR62-6M:~/i2c_proj/PETALINUX/i2c_lidar$ ls
build components config.project hw-description subsystems
siyun@siyun-CR62-6M:~/i2c_proj/PETALINUX/i2c_lidar$ cd components/
siyun@siyun-CR62-6M:~/i2c_proj/PETALINUX/i2c_lidar$ ls
bootloader
siyun@siyun-CR62-6M:~/i2c_proj/PETALINUX/i2c_lidar$ cd ..
siyun@siyun-CR62-6M:~/i2c_proj/PETALINUX/i2c_lidar$ ls
build components config.project hw-description subsystems
siyun@siyun-CR62-6M:~/i2c_proj/PETALINUX/i2c_lidar$ petalinux-config -c u-boot
INFO: Checking component...
INFO: Config linux/u-boot
[INFO ] generate linux/u-boot configuration files
#
# configuration written to .config
#
[INFO ] config linux/u-boot

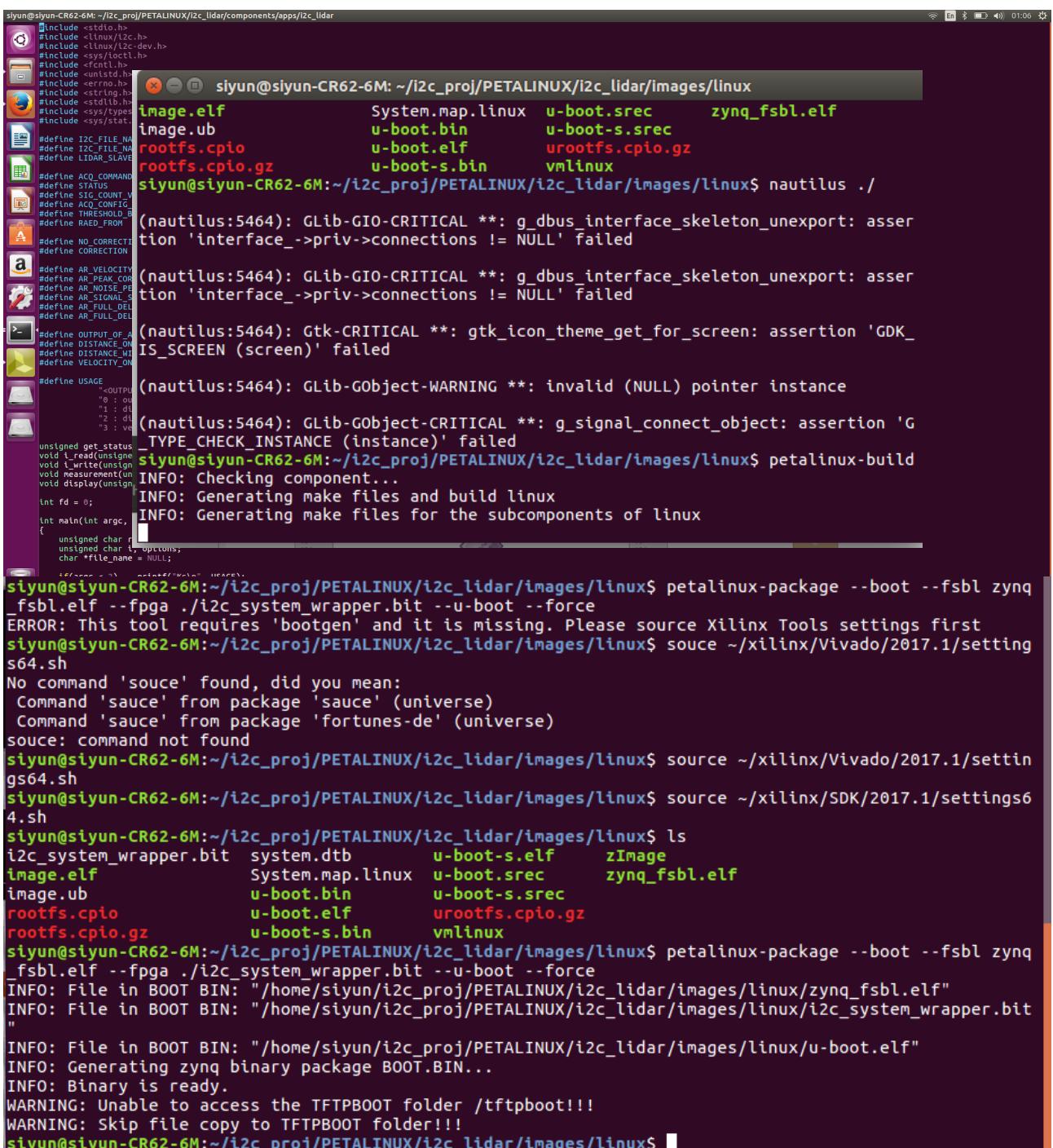
*** End of the configuration.
*** Execute 'make' to start the build or try 'make help'.
siyun@siyun-CR62-6M:~/i2c_proj/PETALINUX/i2c_lidar$
```

```
siyun@siyun-CR62-6M:~/i2c_proj/PETALINUX/i2c_lidar$ petalinux-build
INFO: Checking component...
INFO: Generating make files and build linux
INFO: Generating make files for the subcomponents of linux
INFO: Building linux
[INFO ] pre-build linux/rootfs/fwupgrade
[INFO ] pre-build linux/rootfs/peekpoke
[INFO ] build system.dtb
[INFO ] build linux/kernel
[INFO ] generate linux/u-boot configuration files
[INFO ] update linux/u-boot source
[INFO ] build linux/u-boot
[INFO ] build zynq_fsbl
[INFO ] Setting up stage config
[INFO ] Setting up rootfs config
[INFO ] Updating for cortexa9-vfp-neon
[INFO ] Updating package manager
[INFO ] Expanding stagefs
[INFO ] build linux/rootfs/fwupgrade
[INFO ] build linux/rootfs/peekpoke
[INFO ] build kernel in-tree modules
[INFO ] modules linux/kernel
[INFO ] post-build linux/rootfs/fwupgrade
[INFO ] post-build linux/rootfs/peekpoke
[INFO ] pre-install linux/rootfs/fwupgrade
[INFO ] pre-install linux/rootfs/peekpoke
[INFO ] install system.dtb
[INFO ] install linux/kernel
[INFO ] generate linux/u-boot configuration files
[INFO ] update linux/u-boot source
[INFO ] build linux/u-boot
[INFO ] install linux/u-boot
[INFO ] Expanding rootfs
[INFO ] install sys_init
[INFO ] install linux/rootfs/fwupgrade
[INFO ] install linux/rootfs/peekpoke
[INFO ] install kernel in-tree modules
[INFO ] modules_install linux/kernel
[INFO ] post-install linux/rootfs/fwupgrade
[INFO ] post-install linux/rootfs/peekpoke
[INFO ] package rootfs.cpio to /home/siyun/i2c_proj/PETALINUX/i2c_lidar/images/linux
[INFO ] Update and install vmlinux image
[INFO ] vmlinux linux/kernel
[INFO ] install linux/kernel
[INFO ] package zImage
[INFO ] zImage linux/kernel
[INFO ] install linux/kernel
[INFO ] Package HDF bitstream
[INFO ] Failed to copy images to TFTPBOOT /tftpboot
siyun@siyun-CR62-6M:~/i2c_proj/PETALINUX/i2c_lidar$ █
```

```

siyun@siyun-CR62-6M: ~/i2c_proj/PETALINUX/i2c_lidar/components/apps/i2c_lidar
[INFO ] install linux/kernel
[INFO ] package zImage
[INFO ] zImage linux/kernel
[INFO ] install linux/kernel
[INFO ] Package HDF bitstream
[INFO ] Failed to copy images to TFTPBOOT /tftpboot
siyun@siyun-CR62-6M:~/i2c_proj/PETALINUX/i2c_lidar$ petalinux-create -t apps -n i2c_lidar --enable
INFO: Create apps: i2c_lidar
INFO: New apps successfully created in /home/siyun/i2c_proj/PETALINUX/i2c_lidar/components/apps/i2c_lidar
INFO: Enabling created component...
INFO: It has been enabled to linux/rootfs
siyun@siyun-CR62-6M:~/i2c_proj/PETALINUX/i2c_lidar$ ls
build components config.project hw-description images subsystems
siyun@siyun-CR62-6M:~/i2c_proj/PETALINUX/i2c_lidar$ cd components/apps/
siyun@siyun-CR62-6M:~/i2c_proj/PETALINUX/i2c_lidar/components/apps$ ls
i2c_lidar
siyun@siyun-CR62-6M:~/i2c_proj/PETALINUX/i2c_lidar/components/apps$ cd i2c_lidar/
siyun@siyun-CR62-6M:~/i2c_proj/PETALINUX/i2c_lidar/components/apps/i2c_lidar$ ls
i2c_lidar.c Kconfig Makefile README
siyun@siyun-CR62-6M:~/i2c_proj/PETALINUX/i2c_lidar/components/apps/i2c_lidar$ vi i2c_lidar.c

```



```

siyun@siyun-CR62-6M:~/i2c_proj/PETALINUX/i2c_lidar/components/apps/i2c_lidar
[include <stdio.h>
#include <linux/i2c.h>
#include <linux/i2c-dev.h>
#include <sys/types.h>
#include <fcntl.h>
#include <sys/stat.h>
#include <sys/time.h>
#include <sys/types.h>
#include <sys/stat.h>
#define I2C_FILE_NA
#define I2C_FILE_NA
#define LIDAR_SLAVE
#define ACQ_COMMAND
#define STATUS
#define SIG_COUNT_V
#define ACQ_CONFIG
#define THRESHOLD_B
#define RAID_FRONT
#define NO_CORRECTI
#define CORRECTION
#define AR_VELOCITY
#define AR_PEAK_CDR
#define AR_NOISE_P
#define AR_SIGNAL_S
#define AR_FULL_DEL
#define AR_FULL_DEL
#define OUTPUT_OF_A
#define DISTANCE_ON
#define DISTANCE_WI
#define VELOCITY_ON
#define USAGE
    "0 : ou
    "1 : d
    "2 : v
    "3 : ve
unsigned get_status
void _read(unsigned
void _write(unsigned
void measurement
void display(unsigned
int fd = 0;
int main(int argc,
{
    unsigned char t, options;
    char *file_name = NULL;
    if (argc > 1) {
        if (strcmp(argv[1], "status") == 0) {
            if (fd < 0) {
                perror("Error opening file");
                exit(1);
            }
            if (_read(fd, &t) < 0) {
                perror("Error reading from file");
                exit(1);
            }
            printf("Status: %d\n", t);
        } else if (strcmp(argv[1], "display") == 0) {
            if (fd < 0) {
                perror("Error opening file");
                exit(1);
            }
            if (_display(fd, options) < 0) {
                perror("Error displaying data");
                exit(1);
            }
        } else if (strcmp(argv[1], "measure") == 0) {
            if (fd < 0) {
                perror("Error opening file");
                exit(1);
            }
            if (_measure(fd, options) < 0) {
                perror("Error measuring data");
                exit(1);
            }
        } else if (strcmp(argv[1], "write") == 0) {
            if (fd < 0) {
                perror("Error opening file");
                exit(1);
            }
            if (_write(fd, options) < 0) {
                perror("Error writing data");
                exit(1);
            }
        } else if (strcmp(argv[1], "read") == 0) {
            if (fd < 0) {
                perror("Error opening file");
                exit(1);
            }
            if (_read(fd, &t) < 0) {
                perror("Error reading from file");
                exit(1);
            }
            printf("Status: %d\n", t);
        } else {
            printf("Usage: %s [status|display|measure|write|read] [options]\n", argv[0]);
        }
    } else {
        printf("Usage: %s [status|display|measure|write|read] [options]\n", argv[0]);
    }
}
    siyun@siyun-CR62-6M:~/i2c_proj/PETALINUX/i2c_lidar/images/linux$ petalinux-build
INFO: Checking component...
INFO: Generating make files and build linux
INFO: Generating make files for the subcomponents of linux
    siyun@siyun-CR62-6M:~/i2c_proj/PETALINUX/i2c_lidar/images/linux$ petalinux-package --boot --fsbl zynq_fsbl.elf --fpga ./i2c_system_wrapper.bit --u-boot --force
ERROR: This tool requires 'bootgen' and it is missing. Please source Xilinx Tools settings first
siyun@siyun-CR62-6M:~/i2c_proj/PETALINUX/i2c_lidar/images/linux$ source ~/xilinx/Vivado/2017.1/settings64.sh
No command 'souce' found, did you mean:
Command 'sauce' from package 'sauce' (universe)
Command 'sauce' from package 'fortunes-de' (universe)
souce: command not found
siyun@siyun-CR62-6M:~/i2c_proj/PETALINUX/i2c_lidar/images/linux$ source ~/xilinx/Vivado/2017.1/settings64.sh
siyun@siyun-CR62-6M:~/i2c_proj/PETALINUX/i2c_lidar/images/linux$ source ~/xilinx/SDK/2017.1/settings64.sh
    siyun@siyun-CR62-6M:~/i2c_proj/PETALINUX/i2c_lidar/images/linux$ ls
i2c_system_wrapper.bit  system.dtb      u-boot-s.elf      zImage
image.elf               System.map.linux  u-boot.srec     zynq_fsbl.elf
image.ub                u-boot.bin       u-boot-s.srec
rootfs.cpio              u-boot.elf       urootfs.cpio.gz
rootfs.cpio.gz           u-boot-s.bin   vmlinux
    siyun@siyun-CR62-6M:~/i2c_proj/PETALINUX/i2c_lidar/images/linux$ petalinux-package --boot --fsbl zynq_fsbl.elf --fpga ./i2c_system_wrapper.bit --u-boot --force
INFO: File in BOOT BIN: "/home/siyun/i2c_proj/PETALINUX/i2c_lidar/images/linux/zynq_fsbl.elf"
INFO: File in BOOT BIN: "/home/siyun/i2c_proj/PETALINUX/i2c_lidar/images/linux/i2c_system_wrapper.bit"
INFO: File in BOOT BIN: "/home/siyun/i2c_proj/PETALINUX/i2c_lidar/images/linux/u-boot.elf"
INFO: Generating zynq binary package BOOT.BIN...
INFO: Binary is ready.
WARNING: Unable to access the TFTPBOOT folder /tftpboot!!!
WARNING: Skip file copy to TFTPBOOT folder!!!
    siyun@siyun-CR62-6M:~/i2c_proj/PETALINUX/i2c_lidar/images/linux$ 

```

