Atmel SAM4L Xplained Pro – MicroSD and Smart Signage

ELC 4438 Lab Manual

February 22nd, 2016

Part 1. MicroSD Card

1. Connect the Atmel SAM4L Xplained board with the Atmel **IO1** board through EXT2.
    Connect the Atmel board with the PC through **DEBUG USB**.

2. Open **Atmel Studio 6.2**.
    Click **New Example Project** in the **Atmel Studio 6.2** – SAM4L Xplained Pro tab.
    Click on the small triangle before Atmel-Atmel Corp to see all available examples.
    Choose **SD/MMC/SDIO Card FatFs Example – SAM4L Xplained Pro.**
    Click **OK** to create this example.

3. Click **No tool** on the menu toolbar and select **EDBG** for Selected debugger/programmer in the Tool Tab.
    Click **Start without debugging** (green triangle) in the menu toolbar.

4. The code will create `sd_mmc_test.txt` and write `Test SD/MMC stack`.
    Store your group members' information to a new file that is named after your group's name.

    Show your modified code and the experiment result to your TA.

Part 2. Smart Signage – Combined Temperature Sensor and OLED Display

1. You are to design a digital signage for Baylor Ferrell Center. The basic requirements for the digital signage are as follows.

    i. A BU logo;
    ii. A text line "Baylor Uni.";
    iii. Temperature in Celsius and Fahrenheit;
    iv. Time; and
    v. Dynamic background change according to the sunlight.

    You must create a prototype using the temperature sensor, the light sensor, and the OLED display that you have learned in the previous labs. Simulate the time using your stopwatch program.
    If there is light, use white background for the display and black text and image. If there is no light use black background with white text and image.

    You may add more features such as responding to the touch sensor, scrolling text from left to right or vice versa, a splash screen, temperature log in the micro SD Card, etc.

2. Start from a new program.
   See Introduction to Atmel Software Framework (ASF) if you forget how to do it.

3. Add Standard Serial I/O (stdio), System Clock Control TWI Master, and SSD1306 from ASF Wizard one by one.
   Make sure that one module (driver/component/service) works before you add another module.

4. Set up and initialize everything by referring to the previous project Temperature Sensor and OLED.

5. For conf_clock.h use the following code.

```c
#ifndef CONF_CLOCK_H_INCLUDED
#define CONF_CLOCK_H_INCLUDED

#define CONFIG_SYSCLK_SOURCE        SYSCLK_SRC_DFLL

#define CONFIG_SYSCLK_CPU_DIV        0
#define CONFIG_SYSCLK_PBA_DIV        0
#define CONFIG_SYSCLK_PBB_DIV        0
#define CONFIG_SYSCLK_PBC_DIV        0
#define CONFIG_SYSCLK_PBD_DIV        0

#define CONFIG_DFLL0_SOURCE          GENCLK_SRC_OSC32K
#define CONFIG_DFLL0_FREQ            48000000UL
#define CONFIG_DFLL0_MUL            (CONFIG_DFLL0_FREQ / BOARD_OSC32_HZ)
#define CONFIG_DFLL0_DIV            1

#endif /* CONF_CLOCK_H_INCLUDED */
```

Show the experiment results and explain your program code to your TA.