Atmel SAM4L Xplained Pro – Temperature Sensor and OLED

ELC 4438 Lab Manual

February 15th, 2016

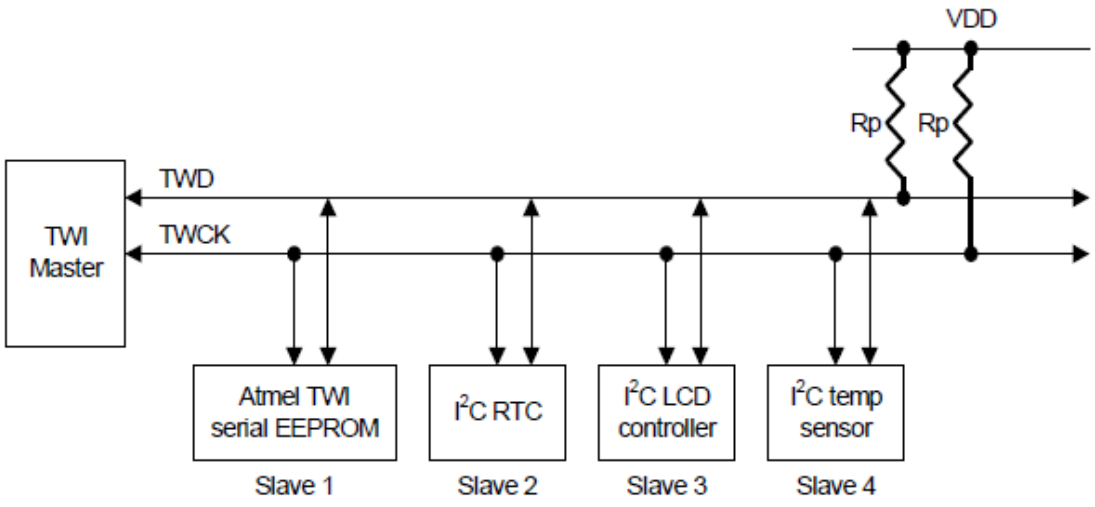
Part 1. Temperature Sensor

1. Download **ATSAM4LC4C datasheet**
   http://www.atmel.com/Images/Atmel-42023-ARM-Microcontroller-ATSAM4L-Low-Power-LCD_Datasheet.pdf

   Refer to Chapter **27** about Two-wire Master Interface (TWIM)**.**

2. Download and read **Temperature_AT30TSE752-754-758_Datasheet.**
   http://www.atmel.com/images/atmel-8751-dts-at30tse752-754-758-datasheet.pdf

   This digital temperature sensor has two parts, a sensor and a serial EEPROM. Both the sensor part and the EEPROM part communicate through a two-wire interface. Below is the picture of the two-wire interface. Find out the addresses of the temperature sensor, the temperature register, and the configuration register.



Rp: pull-up value as given by the I2C Standard

3. Download **LCD_TEMPERATURE_AT30.zip** example project from https://goo.gl/qez6je
   Extract the files to \Documents\Atmel Studio\6.2.

4. Connect the Atmel SAM4L Xplained board with Atmel **IO1** to **EXT2** and **SEGMENT LCD1** boards.
   Take off **VLCD A** and **VLCD B** jumper.
   Connect the Atmel board with the PC through **DEBUG USB**.

5. Open **Atmel Studio 6.2**.
   Click File-Open Project/Solution in the Atmel Studio 6.2 – SAM4L Xplained Pro tab.
   Open the Temperature project.
   Do not forget to run PuTTY serial terminal.

6. 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.
   Understand how the main board communicates to the temperature sensor.
   The program is based on **TWIM_TWIM_EXAMPLE1**.

7. Modify the program to show the room temperature in Celsius degree on the LCD Display.
   If button 0 (SW0) is pressed, show the temperature in Fahrenheit degree.

$$C = (F - 32) \cdot \frac{5}{9} \qquad F = C \cdot \frac{9}{5} + 32$$

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

Part 2. OLED Display

1. Download **SSD1306_EXAMPLE.zip** from https://goo.gl/qez6je
   Extract the files to \Documents\Atmel Studio\6.2

2. Download and read **OLED1 User Guide**

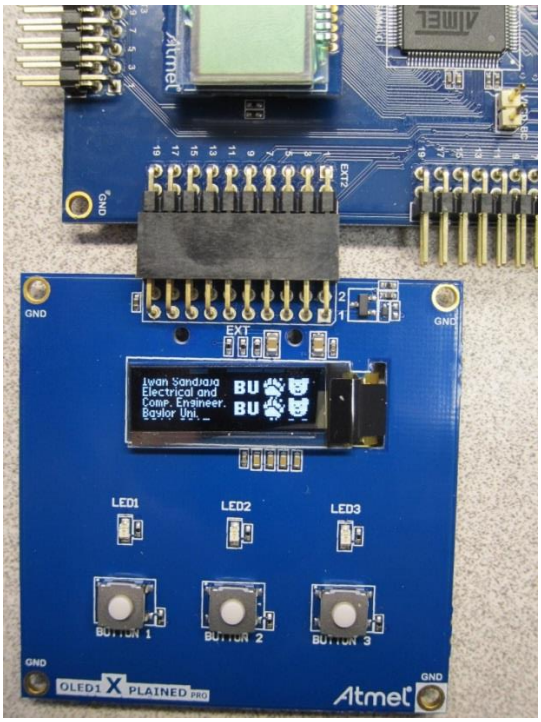
   http://www.atmel.com/images/atmel-42077-oled1-xplained-pro_user-guide.pdf

   http://www.atmel.com/webdoc/oled1xplainedpro/oled1xplainedpro.hardware_users_guide.peripherals.oled.html

3. Download OLED data sheet **OLED1_Datasheet_UG-2832HSWEG04.pdf** from PDF folder in https://goo.gl/qez6je

   Understand how OLED works.

4. Connect the Atmel SAM4L Xplained board with Atmel **OLED1** to **EXT2**. (Note: The sample program only works when you connect the OLED1 board through EXT2!)
   Connect the Atmel board with the PC through **DEBUG USB**.



5. Open **Atmel Studio 6.2**
   Click File-Open Project/Solution in the Atmel Studio 6.2 – SAM4L Xplained Pro tab.
   Open the **SSD1306_EXAMPLE** project.

6. 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.

7. You will see scrolling line on the OLED Display.

   Modify the program to scroll your own image. You can convert your own image into integer value using LCD Assistant (http://en.radzio.dxp.pl/bitmap_converter/).

   Display your own text or image. If SW0 is pressed, a stopwatch appears on the OLED. (The stopwatch program can be referred to your previous lab.)

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