

Lab 0: Intro to Atmel XMEGA Development Board, Soldering/Wire-wrapping, and your TA

OBJECTIVES

In this lab you will meet your TA and give her/him the required information listed below. Your TA will present a short demonstration on soldering & wire-wrapping during this lab; these skills will aid you in building your UF 3744 μ PAD (ATXMega128A1U) Development Board and adding hardware to the board in future labs. After seeing the TA demonstrate these techniques, you will be encouraged (i.e., required) practice soldering and wire wrapping on some practice boards. You will then solder some new headers to access ports and address lines on your μ PAD Development Board.

Meet your TA. Get to know her/him. Understand the lab policies (as stated on the [Lab Rules and Policies](#) document).

REQUIRED MATERIALS

- Read the following:
 - [Lab Rules and Policies](#)
- Submit your first pre-lab report through Canvas.
 - Print parts 13 a) through d) of the pre-lab report (as described in the [Lab Rules and Policies](#) document).
- Read/save the following documents:
 - [Out of the Box \$\mu\$ PAD Assembly Guide](#)
 - [Atmel Studio Installation Instructions](#)
 - [Electronic Assembly handout](#)
 - [Class syllabus](#)
- Toolbox and multimeter (from 3701)
- Wire cutters and needle nose pliers (Figure 1) may be available for use **in lab**, but if you own one, bring your own.
- Soldering iron (available for use **in lab**)



Figure 1: Needle nose pliers.

DISCUSSION

The *Electronic Assembly handout* discusses how to solder, a technique that makes a good electrical (and mechanical) connection between two locations.

If you have a soldering iron and solder from *Intro to ECE*, do **not** use it without explicit instruction from your TA. (The soldering irons from *Intro to ECE* have unregulated heating and may get too hot for our boards. Also, the solder that you get in this class is different than what we use. Mixing solder may lead to unreliable connections; poor soldering irons and soldering technique can burn PCB traces.)

Wire wrapping is another technique for making a good electrical and mechanical connection between two locations. The advantage of wire wrapping over soldering

is that the wire wrapping process can be easily reversed, and with our wire wrap tool, requires no additional equipment. An



Figure 2: A type of wire wrap tool.

electrical connection between two pins is established by wrapping bare wire around the first pin, running insulation covered wire to a second pin, and wrapping the second pin with the bare wire. A wire wrap tool and wire wrap tool tip are shown in Figures 2 and 3, respectively. There should be 5-7 turns of bare conductor on a wire-wrap pin and about 1 to 1.5 turn of insulated wire on the pin, as shown in Figure 4. To obtain 5-7 turns of bare wire, approximately 1-inch of wire should be stripped of insulation.



Figure 3: Wire wrap tool tip.

Multiple wire wrap connections can be made from a single pin (as shown), but daisy chaining (see Figure 5) should be avoided. Instead, wrap from pins A to B, then from pins C to D, and then from pins B to C (as shown in Figure 6). This will allow for easier unwrapping, if necessary.

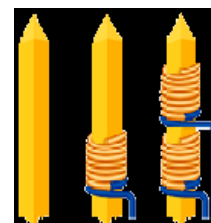


Figure 4: Proper wire wrapping.

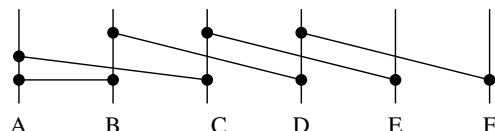


Figure 5: A daisy chain solution.

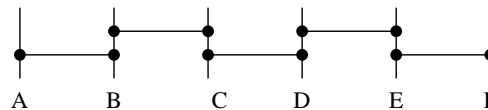


Figure 6: A better daisy chain solution. But to do this it is necessary to know what is coming later.

PRELAB REQUIREMENTS

Read **all** of the documents listed in the above section. Answer the pre-lab questions and complete your first pre-lab report that you will submit to our Canvas account (as specified in the *Lab Rules and Policies* document). Note that your first (Lab 0) pre-lab report will be very short and will only include a few of the items that will be including in all future lab reports. You must print out sections a) through d) for this lab and all of the other labs (even if there is not much to say in a section). Answers to this lab's prelab questions can be found in the posted lab documents.

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Go through the *Atmel Installation Instructions* to install the software on your laptop (or tablet) computer. Obtain a screen shot of-Atmel Studio running on your computer that **also shows your name** in big letters on the same screen. To do a screen shot in Windows, press Ctrl-PrtScr (i.e., select Ctrl and PrtScr at the same time). Copy this screen shot into MS Word (or a similar program) and include this in Appendix section of your pre-lab report that you will submit to Canvas.

Note: Pre-lab requirements **MUST** be accomplished **PRIOR** to coming to your lab.

PRELAB QUESTIONS

1. What minimum lab average is required in order to be **eligible** to pass the course?
2. Can you drop this lab if ... a) you overslept? b) project for other class due? What is the lab makeup policy if you miss a single lab?
3. How late can you arrive for lab and still be admitted? How late can you arrive for lab and still be allowed to take the lab quiz?
4. When soldering a wire to a pin, what should the soldering iron touch and what should the un-melted solder touch?
5. How many turns of bare wire should be on a wire wrap pin? How much wire (in inches) do you need to strip to get these turns on the pins? How many wraps of insulation should be on a wire wrap pin?

LAB PROCEDURE

Parts Kit:

Obtain your 3744 lab kit from your TA. These parts will be used in the labs throughout the semester. **Verify** that your kit has **all the parts** listed on the checklist provided. Immediately notify your TA about any missing parts.

Lab Rules and Policies and Introductions:

Your TA will discuss the lab rules and policies (that you should have already read and agreed to as part of Homework 0) and then give you a general introduction to the laboratory and what will be expected from you for the semester.

Board Construction:

Your TA will demonstrate proper soldering and wire-wrapping techniques so that you will then be able to finish the construction of the board and have the skills to do further soldering and wire wrapping throughout the semester (and throughout your life).

Follow the *Out of the Box uPAD Assembly Guide*, available on the website. For every major component, solder two pins (on opposite corners of the component) and **have your TA check your work before completing**

the soldering for that component. Do **NOT** be overconfident; failure to follow this procedure will result in unnecessary errors that might cost significant **time and money (and lab points)**. If you are not sure, ask first **before** soldering.

You are expected to remain in lab until you are finished with the required soldering (or lab ends). If you do not finish, you need to finish before lab 1 begins (which probably means going to a TA office hour).

Practice Wire Wrapping:

Use the board you have just constructed to practice wire wrapping. Wrap several pins and then show your TA your work. She/he will suggest any problems that he/she sees with your work. Now practice wire un-wrapping by removing the wrap you just installed.

Labs 2 through 8 will each require a significant amount of wire wrapping.