Using an Arduino as an in-system programmer with Atmel Studio

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1 Prefix

This document outlines how to setup and use an Arduino as a programmer with Atmel Studio. It requires that you have Atmel Studio and the Arduino IDE already installed.

1. Flash the Arduino with the ISP sketch

2. Locate the Arduino tools

3. Configure Atmel Studio to use the Arduino as a programmer

4. Connect your microcontroller chip to the Arduino board using the ICSP connector

2 Configuring the Arduino

First, the Arduino must be configured so that it can be used to program other AVR devices. The following steps will walk through how to do this after the Arduino IDE is installed.

1. Open the Ardunio IDE

2. Open the Arduino ISP sketch through **File → Examples → ArduinoISP**

3. Select the board and processor you wish to program through the **Tools** menu

4. Select the Communication port under **Tools → Port**

5. Upload the sketch to the board

This focuses on providing instructions for getting set up on Microsoft Windows. If you require help setting up Atmel Studio or the Arduino, please contact the TAs.

3 Locating Tools

Next, we need to find the folder where Arduino installs the AVR utilities. The following steps will walk thorough how to do this after the Arduino IDE is installed.

1. Navigate to `C:\Program Files (x86)\Arduino\hardware\tools\avr\bin\` or where you installed Arduino

2. Confirm that there is an executable named `avrdude.exe` in that folder

4   Adding an External Tool

Finally, we need to add an external tool to Atmel Studio so that it can upload code to your microcontroller. You will need to plug in the programmed Arduino to the computer.

1. First, you must find the serial port that the Arduino is connected to.

   (a) Open up the Start menu and search for **Device Manager**
   (b) Once Device Manager is open, find the heading for **COM/LPT Ports**
   (c) Note the number of the port associated with the Arduino. It should show up as something like `COM13(Arduino UNO)`.

2. Open up Atmel Studio

3. Open the External Tools menu (**Tools → External Tools**

4. Set the **Command** field to the path found in section 3. For example,

   ```
   C:\Program Files (x86)\Arduino\hardware\tools\avr\bin\avrdude.exe
   ```

5. Set the Arguments field to

   ```
   -v -p m1284 -c arduino -P <COM PORT> -b 19200
   -U flash:w:"$(ProjectDir)Debug\$(ItemFileName).hex":i
   -C "C:\Program Files (x86)\Arduino\hardware\tools\avr\etc\avrdude.conf"
   ```

   replacing `<COM PORT>` with the serial port that the Arduino is connected to and possibly modifying the path to the configuration file.

6. If you want to see the full output every time, uncheck the box marked **Close on Exit**

5   Connecting the Microcontroller and the Programmer

Now you need to connect your microcontroller (currently on a breadboard) to the programmer using the ICSP connector.

1. Find the schematic for the the Arduino board you are using

2. Locate the ICSP connector on the schematic

3. Find the pinout of the microcontroller you are using

4. Use the pinout from the microcontroller datasheet and the ICSP schematic of the programmer to connect the two (**Do not power anything till you check with the TA**)