

Microcontroller Firmware (Initial)

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The microcontroller for my digital thermostat module runs firmware written using the C programming language. Thanks to the open-source-friendly nature of Atmel's AVR microcontrollers, development of the firmware requires no proprietary tools.

I am using an advanced text editor to write the C code. I then compile the code using the avr-libc libraries and AVR-GCC compiler, which is an extension of the venerable GNU GCC compiler. The software used to facilitate programming to the microcontroller is called AVRDUDE and is also open-source. Lastly, the hardware used to facilitate programming is the Atmel STK-500 development board. I program the microcontroller using its serial In System Programming (ISP) interface.

I have completed an "initial" release of firmware for my microcontroller. I present this version, version 0.1.3 as the initial version since it is the first version that does anything useful. This version of the firmware is capable of reading the temperature and humidity from the sensors. It displays temperature on the LCD screen in actual Celsius and Fahrenheit units. It displays humidity as a raw number from 0 to 1023, as read directly from the ADC. The code also has provisions for most LCD functionality, including a 5x7-pixel font and a larger, incomplete pixel font.

The code files which are a part of firmware version 0.1.3 can be viewed below:

[lcd.c – v0.1.3](#)

[lcd.h – v0.1.3](#)

[font.h – v0.1.3](#)

[main.c – v0.1.3](#)

[main.h – v0.1.3](#)

[screen.c – v0.1.3](#)

[screen.h – v0.1.3](#)

[interrupts.c – v0.1.3](#)

[interrupts.h – v0.1.3](#)

[text.h – v0.1.3](#)
