# Project - DS18B20 Thermometer

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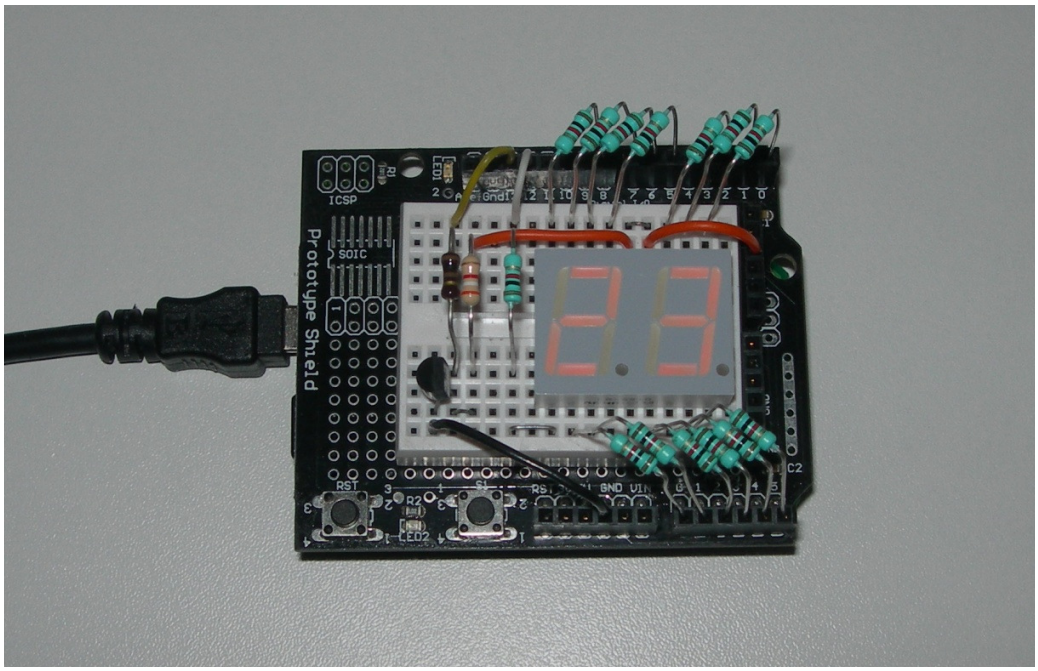
## Introduction

The 1-wire is a serial interface which is only using one wire (plus the ground) to transmit data between a microcontroller and a 1-wire component. Moreover, the power supply of the 1-wire component can be drawn by the serial interface itself, making the 1-wire a very interesting communication link to connect various sensors to a microcontroller. A lot of components using 1-wire are available today: RTC, memories, sensors...

I will not deal with the 1-wire protocol and its possibilities in this application note. A very nice tutorial is available on Maxim Semiconductors website to introduce the 1-wire bus: http://www.maxim-ic.com/products/1-wire/flash/overview/index.cfm.

If you are looking for 1-wire components, checkout Maxim Semiconductor website: http://www.maxim-ic.com/products/1-wire.

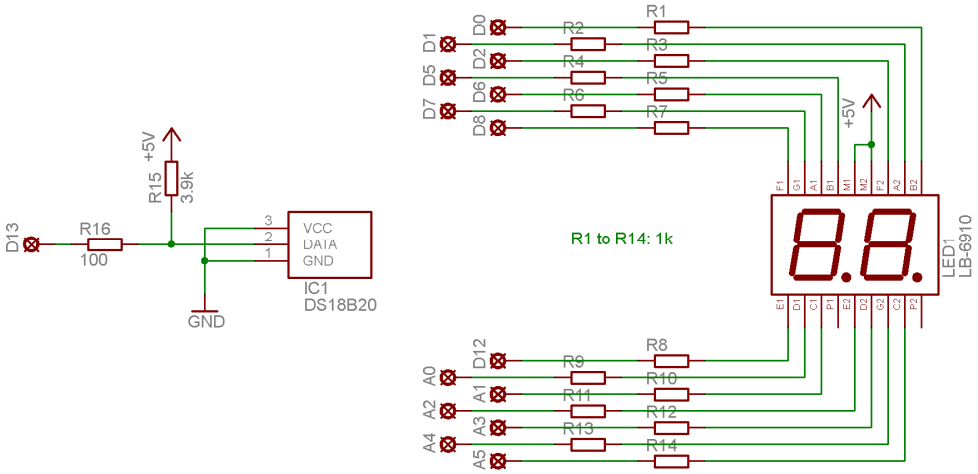
This project shows how to simply use a 1-wire temperature sensor to create a simple thermometer.




This project is based on the 1-wire application note available on my website.

# 1 Schematic

The LED digits are not multiplexed. The 1-wire device is connected to the microcontroller using two simple resistors.



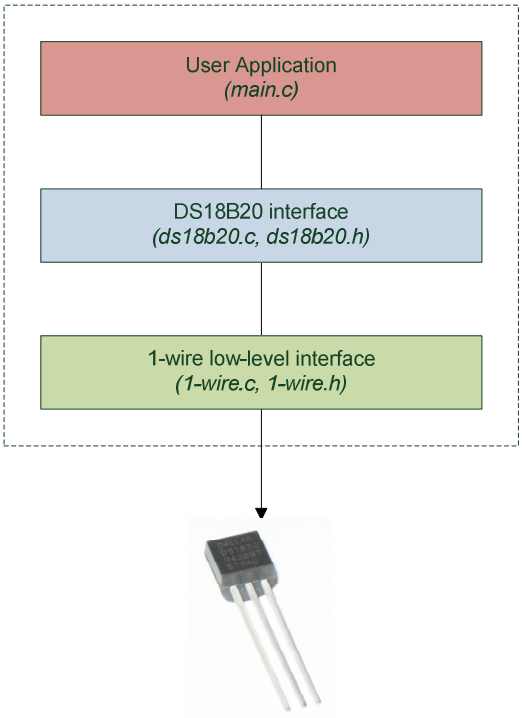

The pull-up resistor R15 is used to power the sensor. The microcontroller will also be used to draw current during temperature conversion, and it's why R16 is added, in order to limit the current in case of shortcut on the 1-wire device.

The components are connected on the breadboard of a simple protoshield.

# 2 Software

## 2.1 1-Wire library

This project is based on the 1-wire application note available on my website. The software architecture of the 1-wire library is very simple.



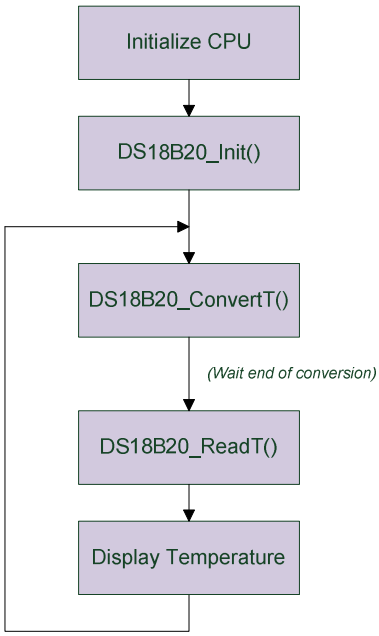

The 1-wire interface contains low level functions used to communicate with the 1-wire device. Those functions are basic functions which can be used to interface any 1-wire component to the microcontroller, and not only temperature sensors.

DS18B20 interface contains specific functions to use the DS18B20 device. It uses the 1-wire functions to communicate on the 1-wire bus.

Finally, the application is simply using the DS18B20 functions to get the current temperature.

## 2.2 Thermometer application

The DS18B20 Thermometer uses the DS18B20 functions to get and display the current temperature according to the following schema.




The application performs several initializations and finally reads and displays the temperature in an infinite loop.

## Conclusion

This project shows how to use a DS18B20 temperature sensor to make a thermometer. This project is interesting for beginners who want to start programming and debugging on Freescale microcontrollers by creating a very simple application.