

# Class Report 5: I2C Temperature Sensor

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## 1 Introduction

In this project the I2C core was utilized to interface with the onboard ADT7420 temperature sensor and display its output on the seven-segment display. The peripheral is accessed by first performing a write transaction containing the device address and the register to be read, the read transaction follows immediately and retrieves the temperature reading from two successive data register reads. The 13 MSB's from this transaction are the temperature in Celsius and are then converted to binary coded decimal (BCD) to display. Source files for SystemVerilog and C++ can be found [here](#) and a video demonstration [here](#).

## 2 Implementation

The sample code provided by Chu is leveraged heavily for this demonstration. The I2C core was implemented and interfaced with the FPro bus before exporting the hardware file to the Vitis environment. The provided drivers were imported into a new project and used to interface with the ADT7420 by issuing read and write transactions specifying the device address, register and number of bytes to be read. Once the reading is returned over the I2C bus it is right shifted to isolate the leftmost 13 bits. These bits are formatted such that the value may be type cast as an integer and divided by a resolution scalar to acquire the temperature in Celsius. After converting to Fahrenheit and then again to BCD, the individual digits are provided to the appropriate seven-segment LED display.