

I2C interfacing on EV-COG-AD3029 platform using Mbed OS

- **Features:**

- [ADuCM3029](#) has one I2C port
- It supports fast mode (400 kHz) and standard mode (100 kHz)
- It supports for 10-bit addressing and repeated starts
- Clock stretching supported for both slave and master

- **Overview:**

- Create object for class [I2C](#) specifying SDA and SCL pin parameters
 - SDA pin: 'I2C_SDA' and SCL pin: 'I2C_SCL'
- I2C frequency can be specified by [frequency](#)(int hz) function where 'hz' parameter is frequency in hertz
- For writing data on slave device, use [write](#)() function which has four parameters as follows:
 - address: 7-bit device address of slave
 - array pointer: for array which stores register address and data
 - length: number of bytes to be transmitted
 - repeated: repeated start (default = false)
- For reading data from slave device, use [read](#)() function which has four parameters as follows:
 - address: 7-bit device address of slave
 - array pointer: for array which stores data received from slave
 - length: number of bytes to be received
 - repeated: repeated start (default = false)

- **Example Code:**

- For programming AD3029 board using Mbed OS [click here](#)
- **Example 1:** Read temperature data from [ADT7420](#) temperature sensor onboard AD3029
 - Program reads temperature data from ADT7420, converts it into °C and prints on serial terminal
 - Initialize I2C at 100 kHz and UART at 9600 bps
 - To write at memory location on slave device, first byte sent must be address of memory location while second byte is data to be stored at that memory location on slave device
 - To read memory location from slave device, first using write() function address of memory location from which data has to

read is sent, then using read() function we can read data byte stored at that memory on slave device

- For reading operation write() function is specified with 'repeated' parameter as 'true' i.e. repeated start condition is sent and then reading of data byte/s occurs
- Controller receives 16-bit data in two bytes, then it is combined and converted into °C format and sent through serial port to PC

- **Note:**

- AD3029 board has I2C bus with on board pull-ups which can be activated or deactivated by pulling GPIO28 pin high or low respectively
- ADT7420 does not have separate pull-up resistors, hence in order to pull SCL and SDA lines high (Idle state), GPIO28 pin needs to pull high
- When interfacing with external I2C module there is no need to pull GPIO28 pin high if and only if that module has onboard pull up resistors connected to SCL and SDA lines
- Communication with ADT7420 is setup at 100kHz and not at 400kHz; because at 400kHz, SCL frequency is observed to be approximately 290kHz and not 400kHz. So instead of fast mode (400kHz) , normal mode (100kHz) is used.

- **References:**

- <https://os.mbed.com/platforms/EV-COG-AD3029LZ/>
- <https://www.analog.com/media/en/dsp-documentation/processor-manuals/ADuCM302x-mixed-signal-control-processor-hardware-reference.pdf>
- <https://www.analog.com/media/en/technical-documentation/data-sheets/ADT7420.pdf>
- <https://os.mbed.com/docs/mbed-os/v5.13/apis/index.html>