EEE3096S - Tutorial 2
2022

3 I2C, Epochs and Binary Coded Decimal

Submit a single PDF (named correctly with STUDNUM1_STUDNUM2_Tut2.pdf) answering the following questions. If you pull from any sources, be sure to correctly cite them.

3.1 I2C

I2C is a synchronous communication protocol (a common clock signal is used to synchronise the data transfer). It requires only two bus line, SDA (data line) and SCL (Clock line). Each device connected on the bus is identified by its unique address.

1. Give the message structure for I2C protocol when master communicates with slave. [4]
2. Give 2 advantages of I2C over SPI. [2]
3. Describe the start and stop conditions for I2C. [2]
4. Draw a timing diagram showing a Master sending 0b11010101 to slave at address 0b1110000. [8]

3.2 Binary Coded Decimal (BCD)

1. Explain what Binary Coded Decimal is. [2]
2. Mention one advantage and one disadvantage to using BCD. [2]
3. Write pseudocode or draw UML diagrams for converting from decimal to BCD and converting from BCD to decimal. Assume that you are implementing the functions **uint8_t DecToBCD(int val)** and **int BCDtoDec(uint8_t val)**. [4]

3.3 Unix Epochs

1. Explain briefly what Unix Epoch Time is and why it is used. [2]
2. Write pseudocode for converting to Unix Epoch Time from a timestamp with the format **YYYY-MM-DD hh:mm:ss**. Assume you have access to each value i.e. you do not need to worry about splitting the timestamp. You may also ignore the effects of leap seconds/years. You can use the Epoch Time (1640988000) for Saturday, January 1, 2022 12:00:00 AM GMT+02:00 as a starting point. [4]