University of Texas at El Paso
Electrical and Computer Engineering Department

EE 4178/5190 – Laboratory for Microprocessors II

LAB 8

DAC Peripheral

Objective:

- The objective for this lab is to use and understand the DAC driver of espressif. The ESP32 DAC has a 8-bit resolution therefore the output ranges from 0-255 bits or 0.0-3.3V. Knowing this, for this lab use GPIO 25 to generate a sine wave and in GPIO 26 generate a triangle wave.

Bonus:

- For EE4178 is just a bonus and for EE5190 is mandatory
    - o Make a Sawtooth wave in GPIO 25.
- Bonus for EE5190
    - o Make the sine wave have a 10 Hz frequency.

Pre-Lab:

- What is DAC used for?
- If the output has an 8-bit resolution, what is the max value output?
- How many DAC channels does the ESP32 has?
- What is the two functions to use the DAC in the ESP32?

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C helpful functions

For this Lab, there is two additional functions from ESPRESSIF that are important while using DAC. The function needed to enable the DAC **dac_output_enable(dac_channel_t channel)**, the channel is specific for 2 channels which are declare on the structure below.

- typedef enum {
        DAC_CHANNEL_1 = 0,   /*!< DAC channel 1 is GPIO25(ESP32) /
    GPIO17(ESP32S2) */
        DAC_CHANNEL_2 = 1,   /*!< DAC channel 2 is GPIO26(ESP32) /
    GPIO18(ESP32S2) */
        DAC_CHANNEL_MAX,
} **dac_channel_t;**

Finally, the last function needed in order to produce a DAC output will be **dac_output_voltage(dac_channel_t channel, uint8_t dac_value)** which you need to put the DAC enabled pin and the actual DAC value. Note: The DAC output value has a 8-bit resolution which its max output is a 255 value which represents 3.3V.

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