**Kocaeli University, Electronics and Telecommunications Engineering Department**

**Digital Communications Laboratory**

**Experiment 2: Pulse Code Modulation (PCM) - Lab Report (04.03.2024)**

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| Name-Surname-Number: |
| Name-Surname-Number: |
| Name-Surname-Number: |

**SIMULINK PART - The table below is for verification only and filled by the lab instructor.**

|  |  |
| --- | --- |
| Understanding sample rate and quantization levels (15 pts) |  |
| Understanding quantization errors (10 pts) |  |
| Understanding PCM representation of each quantization level (15 pts) |  |

**STM32 PART - Section 1: Sampling an Analog Voltage**

**Step 1:** Build a voltage divider using a potentiometer (place it on a breadboard) and connect the variable voltage pin of the potentiometer to **ADC input pin (A5 on Nucleo-64 or PC0 on Discovery)**.

**Step 2:** Run your STM32 C code in **debug mode**, inspect the value of adcValue variable in Watch1 and fill in the table below. (15 pts)

|  |  |
| --- | --- |
| **Analog Voltage** | **n = 8 bit** |
| 3.3V |  |
|  |  |
| 0V |  |

**Section 2: PCM Bits**

**Step 3:** Connect NI Elvis II Scope CH0 to **Frame Sync Signal** **(D8 on Nucleo-64 or PA9 on Discovery)**.

**Step 4:** Connect NI Elvis II Scope CH1 to **Clock Signal** **(D6 on Nucleo-64 or PB10 on Discovery)**.

**Step 5:** Adjust the Scope divisions (1V/Div, 125µS/Div). Set Scope CH0 vertical position at -3V. Set your Scope “Trigger Type” to “Edge”, “Level” to “1V” and Trigger “Source” to “Scope CH0”. (5 pts)

**Step 6:** How many Clock Signal Cycles (periods) between two Frame Sync Signal Pulses? Fill the Table below. (5 pts)

|  |  |
| --- | --- |
| **Clock Cycle Counts** |  |

**Step 7:** Plot your Scope screen on the left graph. (15 pts)

**Step 8:** Disconnect Scope CH1 from Clock Signal and connect it to **PCM output** **(D7 on Nucleo-64 or PA8 on Discovery).**

**Step 9:** Plot your Scope screen on the right graph. (15 pts)

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**Section 3: Mastering PCM C Code**

**Step 10:** Answer the question written on whiteboard. (20 pts)