

DSP VLSI Systems

Homework (IX)

Processing Elements Design

Deadline: Dec. 7

1. Find the simplest implementation of a serial/parallel multiplier with fixed coefficient when the coefficient is
 - (a) $(0.011001)_{2C}$
 - (b) $(0.111011)_{2C}$
 - (c) $(1.011001)_{2C}$

2. Conversion between RGB and YCbCr digital color video image formats can be performed by the following transformations:
$$R = Y + 350Cr / 256 - 175 / 256$$
$$G = Y - 86Cb / 256 - 178Cr / 256 + 132 / 256$$
$$B = Y + 444Cb / 256 - 222 / 256$$
and
$$Y = (77R + 150G + 29B) / 256$$
$$Cb = (-44R - 87G + 131B) / 256 + 128$$
$$Cr = (131R - 110G - 21B) / 256 + 128$$
The color components are quantized to 8 bits. Derive an implementation based on
 - (a) Bit-serial multipliers
 - (b) Distributed arithmetic
 - (c) Compare the two implementations.

3. Describe how to use CORDIC to efficiently compute the distance of a point (x, y) to the origin.

Please deliver the homework to the TA:

BL-421, 吳柏辰, pcwu@media.ee.ntu.edu.tw

除非為程式作業，作業盡量繳交紙本格式，不過要交電子檔也沒關係