

EE2016 Microprocessor Lab & Theory

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Project 1: Random Number Generation in ARM

1 Aim

1. Generate TEN, 32 bit random numbers using the utility RNG
2. Demonstrate the use of random number generation, by estimating the value of pi and in another prove the identity related to estimators.

2 Equipments, Hardware Required

The list of equipments, components required are:

1. ARM ViARM 2378 Development board and accessories
2. ARM SDK keil microvision 5
3. flash magic
4. teraterm

3 Problem definition

Generate a true random number in ARM processor in realtime and show two applications

3.1 Generation of RV

1. Use the utility RNG in ARMv7 to generate a 32-bit random number
2. Implement serial communication in ARM development board to connect the ARM development kit to the PC (in which KEIL and teraterm softwares are loaded).
3. Using the established serial communication, display the generated 32-bit random number in the PC

3.2 Applications of RNG

Use the above RN generating mechanism for proving an identity in estimation theory and in computing the approximate value of pi. All computations are to be done in ARM processor itself. Display the output in PC using serial communications.

1. Use the sample variance estimator to estimate the variance of the generated RV realizations
 - (a) Estimator #1, considers a single sample, while estimator #2 considers ALL the samples.
 - (b) Show the estimator #2 has lower variance than the estimator #1.
2. Use the above generated RV realizations to obtain the estimate of π (This is called Monte-Carlo method. Refer https://en.wikipedia.org/wiki/Monte_Carlo_method).