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Random Number Generator Using Seven Segment Display In Labview

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ABSTRACT
Random number generator [RNG] is use to generate random numbers between any given limit, RNG's are two kinds 1.True random number and 2.pseudom numbers. True random numbers are not predictable by any mathematical formula because they are mainly depends on the atmospheric noise, coming to the pseudo numbers are mainly used in most of computers, this randomness can be predictable by using mathematical formula and it is fine many purposes, but it may not be random in the way you expect if you are used to dice rolls and lottery drawings. In this mini project we are doing RNG [pseudo numbers] by using NI labview software and generating random numbers by pressing push button and coming output we are displaying on seven segment display. In the labview it easy to generate a random number by using different block's and main advantage of the labview is there is no need of any programming languages like[c,c++,java,matlab].Main function of this project is used for gaming and priority number generation and etc. A sequence of uniform random numbers, which is generated within the computer in a deterministic manner, is often referred to as a pseudo-random number sequence.[1]

I. I.INTRODUCTION:

In our daily life as we know that the random numbers play a very prominent role. In ancient days also there are many of these applications like throwing a dice, playing cards, and many more applications have come into notice and some of them are generating data encryption keys, simulating and modelling complex phenomena and for selecting random samples from larger data sets. Random numbers are a valuable component in diverse applications that range from simulations[1]over gambling to cryptography [2].With the advent of computers; programmers recognized the need for a means of introducing randomness into a computer program. However, surprising as it may seem, it is difficult to get a computer to do something by chance. A computer follows its instructions blindly and is therefore completely predictable. There are 2 types of random generators 1.Pseudo Random generator (PRNG) 2.True Random Generator (TRG). In today's world security is of prime importance and hence cryptography plays an important role in computer and networking security. Cryptographically secure random number generators are essential for this purpose. The versatility of this project in many fields urged and motivated us to select the same. Random numbers are a vital ingredient in many applications ranging, to name some examples, from computational methods such as Monte Carlo [5] simulations and programming, over to the large field of cryptography for generating of crypto code or masking messages,

as far as to commercial applications like lottery games and slot machines. Recently the range of applications requiring random numbers was extended with the development of quantum cryptography and quantum information processing [3].

a)Why Labview:

        Labview is a programming language developed by the National instruments in mid 80's by Jeff Kodosky.VI stands for Virtual Instrument is used in programmer. The programmer uses the Labview programming environment to make the user interface by dragging and dropping objects and according to the desired levels, we can arrange them. Herein LabView programs no lines of codes are written ,the functionality of the program is provided by the diagram, that is main advantage of using LabView and any one can understand the overview of the entire program by seeing the block diagram which is in the control panel.

        Another major advantage of using labView is that is closely supporting the multitude of processing cards available from National Instruments. The cards are so tightly coupled to the LabView system is common in collecting data within a few hours of receiving the data in the mail.

        For the above mentioned reasons, Labview has become one of the most popular collection systems of the desired data. In LabView we can analyze the signals, signals can be transmitted, signals can be received and user interfaces can be

created within the framework of LabView. Moreover we can combine the MatLab and C programming codes with the Labview block diagrams.

Finally Labview is the most powerful graphical programming system which is compatible with a multitude of data collection cards. People use it very convenient and there is no need to require the entire knowledge.

II. RANDOM NUMBERS:

A physical process which generates numbers randomly is required for computing. This is called TRUE RANDOM NUMBER GENERATOR. It is often called as RNG. The many applications of randomness have led to different methods for generating random data. For security purpose the quality of random number generator process is always required. If quality is lacking then attacks are possible. Random-bit generators (RBGs) are key components of a variety of information processing applications ranging from simulations to cryptography [4].

a)TYPES OF RANDOM NUMBERS:

There are mainly two types of random numbers. They are
1. Pseudo Random number generator.
2. True Random number generator.

i)TRUE RANDOM NUMBER GENERATOR:

A physical process which generates numbers randomly is required for computing. This is called TRUE RANDOM NUMBER GENERATOR. It is different from a computerized program. These devices are based on mainly microscopic phenomenon which produces low level noise which implies random noise signals. Some of examples of random noises are Thermal noise, Photoelectric effect, and other quantum phenomenon. Generally these are in theory .Those are difficult to predict. So

experiments should be performed to have assertions. The circuit of random number generator consists of a transducer, which converts the physical phenomenon into electrical signal. It also consists of an amplifier and some other electronic circuitry which increases the amplitude of random fluctuations. More over It consists of Analog to Digital convertor. The random numbers are obtained by sampling the randomly varying signal.

ii)PSEUDO RANDOM NUMBER GENERATOR:

There is another algorithm which is different from true random number generator that is known as deterministic random number generator. A **pseudorandom number generator** (**PRNG**) is an algorithm for creating a structure of numbers whose properties imprecise the properties of sequences of random numbers. Although sequences that are closer to truly random can be produced using hardware random number generators, *pseudorandom* number generators are important in exercise for their speed in number generation and their reproducibility. The PRNG-generated sequence is not truly random, because it is completely determined by a moderately small set of primary values, called the PRNG's *kernels* (which may include truly random values). It is, also known as a **deterministic random bit generator** (**DRBG**). These are central in submissions such as simulations (e.g. for the Monte Carlo method), electronic games (e.g. for procedural generation), and cryptography. Cryptographic applications require the output not to be likely from earlier outputs, and more elaborate procedures, which do not inherit the linearity of simpler PRNGs, are needed.

Upright statistical properties are a vital prerequisite for the production of a PRNG [6].
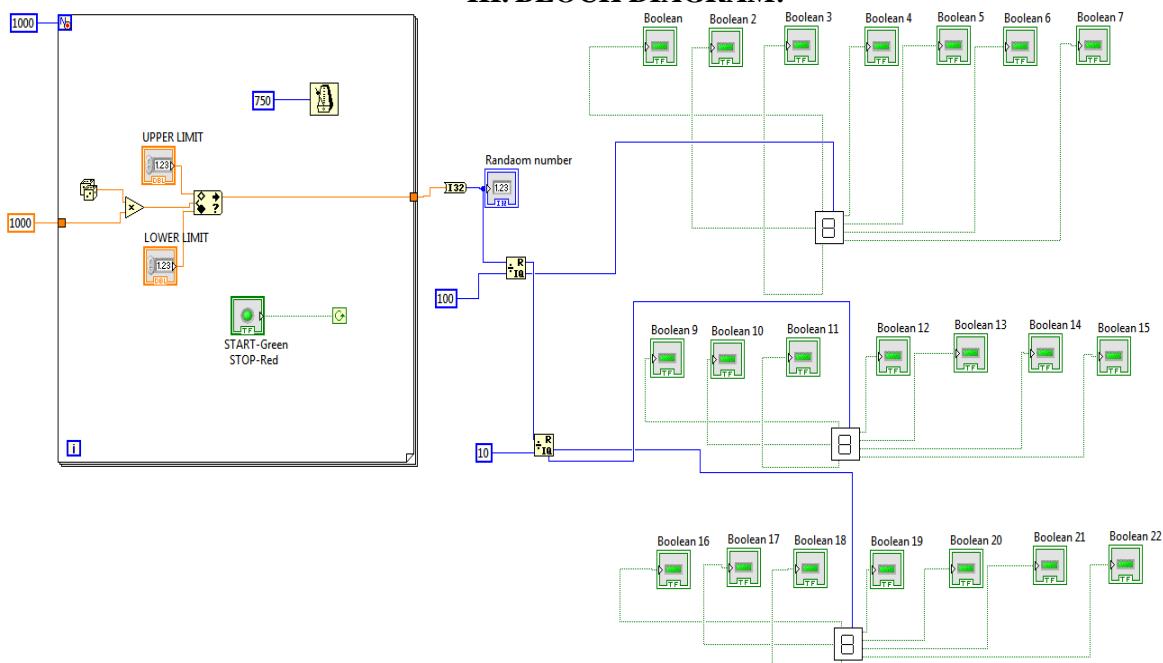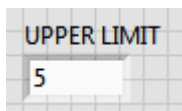
III. BLOCK DIAGRAM:

Figure 1:

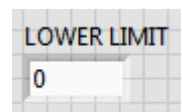### A) BLOCK DIAGRAM COMPONENTS:

UPPER LIMIT:

Select one numerical control named as upper limit. We can specify any number according to our conditions.

<u>In Front Panel Right click>>Numeric>>Numeric Control>> name it Upper limit.</u>
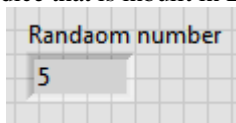
LOWER LIMIT:

Select another numerical control named as lower limit. We can specify any number according to our conditions.

<u>In Front Panel Right click>>Numeric>>Numeric Control>>name it Lower limit.</u>

RANDOM NUMBER:

It is another number control which is having the final output value that is generated randomly which depends on the dice that is inbuilt in LabView.

<u>In Front Panel Right click>>Numeric>>Numeric Control>>name it Random Number.</u>
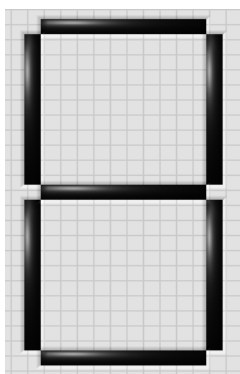
START AND STOP:

Place one round LED which will act like start or stop button. If we press start button the generation of random numbers will start and the process going on. Before pressing the stop button what the number is present that number is displayed in random number when we press stop button. For start button green color will come. For stop button the color is red. The color of the LED is depending on us. We can change the color according to the required conditions. It is purely depend on us.

<u>Right Click>>Boolean>>Round LED (Enlarge it).</u>
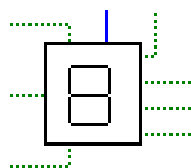
SEVEN SEGMENT DISPLAY:

We can arrange seven segment display using 7 Rectangular LEDS as shown in figure below. Join the rectangular LEDS side by side as shown in figure.

Right Click>>Boolean>>Square_LED (Take 7 and arrange them accordingly as shown in the figure).

IV. CREATING NEW SEVEN SEMENT VI:

We know there is seven lines in seven segment display. let the lines be A B C D E F G. Use case structure. Create 10 cases .10 cases for numbers 0 to 9.In every case place true and false. According to the number connect A to G to either true or false. For example to display zero G is false and remaining all are true. For displaying 1 only B and C are true and remaining are false. And the remaining will follow the same procedure which is described earlier. What ever the number is given to the block diagram it is converted into seven segment display. Now select Edit Icon and draw the figure of desired icon and now by selecting the number of inputs and outputs we can create a new VI. By creating a new VI the size of entire block diagram is replaced by the VI. So that the size is reduced. Where ever we require seven segment display is required there is no need to keep the entire block diagram .In that place we can keep this VI. The block diagram becomes compact. In our random generator program we use 3 seven segment displays. So we can use 3 seven segment Vis instead of them.

DELAY:

We can keep delay in the program and set them according to our need. In timing select wait until next ms is there. By creating a constant to it we can introduce that value as milliseconds.

In the above diagram we have kept the constant value as 750 .So the delay will be 750 ms. If we keep

1000 then the delay is 1000 ms i.e. 1 sec delay. That means the time gap between the present random number and another random number is 1 sec. So that we can see the displaying of numbers very clearly without ambiguity. The delay should be accurate. The delay should not be too slow or too fast. It should be optimum.
Right Click>>Programming>>Timing>>Delay.

FOR LOOP:
Select "for loop" from programming windows and select N value as required number of iterations and to repeat the process.
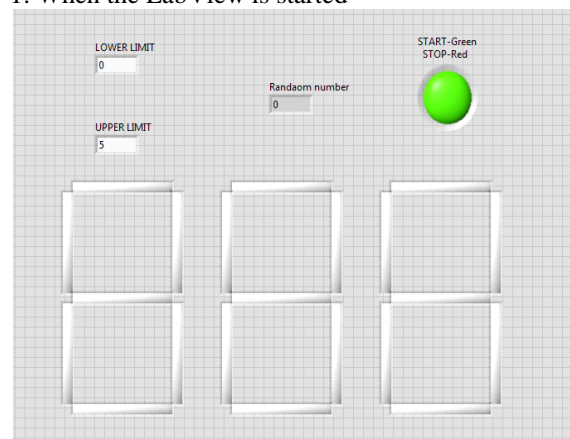Right click>>Programming>>structures>>for loop.
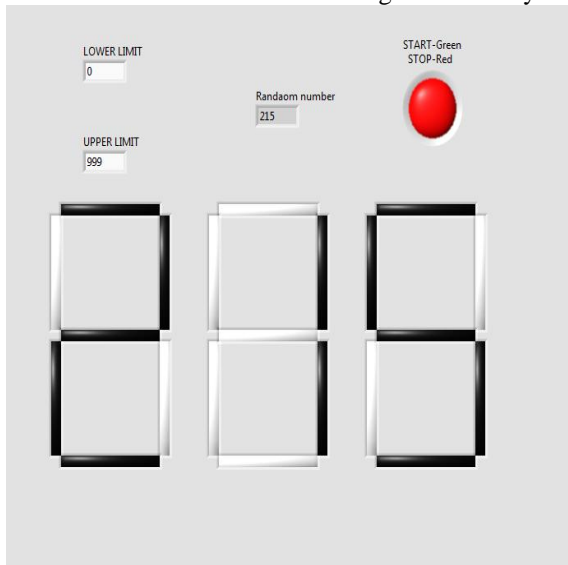
V. PROCEDURE:

Take a for loop and keep two numerical controls. One for upper limit and another for lower limit. Select one random generator for the random number generator in between 0 and 1.So all the decimal numbers between 0 and 1 are generated randomly. If we want single digit numbers multiply the Random generator with 10.For double digit numbers multiply with 100.For three digit numbers multiply with 1000 and so on. Now the numbers are checked with two limits. Those are upper limit and lower limit which we will specify according to our wish. Select In Range and Coerce which will send the numbers that fall between upper and lower limits. If not the number is discarded. So what ever number from random number generator is multiplied with a constant and is checked in range and coerce. That number is taken as output which is random number. Now that number is divided by 100 and the divisor is given to seven segment VI and quotient is again divided by 10 and the divisor is given to another seven segment VI. Again that divisor is divided by 10 and remainder is given to another VI. For 3 digit numbers we use 3 seven segment VI. For 4 digit numbers we can use 4 Vis and so on. Finally the random number is displayed in seven segment.
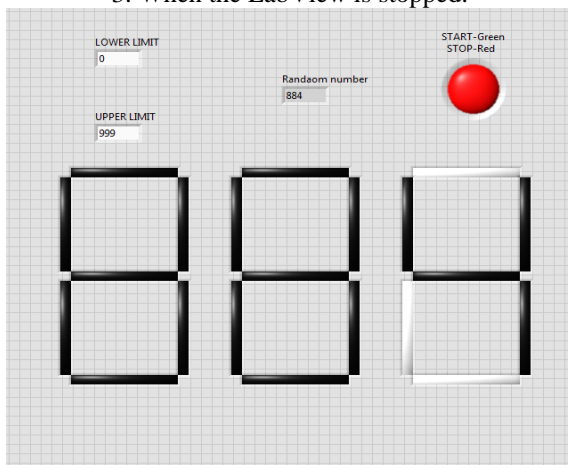
VI. RESULTS
1. When the LabView is started

2. When the LabView is running continuously

3. When the LabView is stopped.

VII. APPLICATIONS
1. Lotteries and Draws.
2. Games and Gambling.
3. Random Sampling such as drug screening.
4. Simulation and Modeling.
5. Security such as data encryption keys generating.
6. Arts.

All of the first five applications belong to True Random Generators and the last application belong to Varies i.e., True Random Generator, Pseudo random generator. Random number generators are a vital bond in the computer security chain. They are very significant in the construction of encryption keys and other cryptographic algorithm factors.

REFRENCES
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