Binary Source

December 1, 2016

This block generates a sequence of binary values (1 or 0) and it can work in four different modes:

1. Random
2. PseudoRandom
3. DeterministicCyclic
4. DeterministicAppendZeros

This blocks doesn't accept any input signal. It produces any number of output signals.

Input Parameters

- mode{PseudoRandom}
  (Random, PseudoRandom, DeterministicCyclic, DeterministicAppendZeros)
- probabilityOfZero{0.5}
  (real ∈ [0,1])
- patternLength{7}
  (integer ∈ [1,32])
- bitStream{"0100011101010101"}
  (string of 0's and 1's)
- numberOfBits{-1}
  (long int)
- bitPeriod{1.0/100e9}
  (double)

Methods

BinarySource(vector⟨Signal *⟩ &InputSig, vector⟨Signal *⟩ &OutputSig) :Block(InputSig, OutputSig){};

void initialize(void);

bool runBlock(void);

void setMode(BinarySourceMode m) mode = m; BinarySourceMode const getMode(void) { return mode; };

void setProbabilityOfZero(double pZero) { probabilityOfZero = pZero; };

double const getProbabilityOfZero(void) { return probabilityOfZero; };

void setBitStream(string bStream) { bitStream = bStream; };

string const getBitStream(void) { return bitStream; };

void setNumberOfBits(long int nOfBits) { numberOfBits = nOfBits; };

long int const getNumberOfBits(void) { return numberOfBits; };

void setPatternLength(int pLength) { patternLength = pLength; };

int const getPatternLength(void) { return patternLength; }

void setBitPeriod(double bPeriod);

double const getBitPeriod(void) { return bitPeriod; }

Functional description

The *mode* parameter allows the user to select between one of the four operation modes of the binary source.

Random Mode Generates a 0 with probability *probabilityOfZero* and a 1 with probability 1-*probabilityOfZero*.

Pseudorandom Mode Generates a pseudorandom sequence with period $2^{patternLength} - 1$.

DeterministicCyclic Mode Generates the sequence of 0's and 1's specified by *bitStream* and then repeats it.

DeterministicAppendZeros Mode Generates the sequence of 0's and 1's specified by *bitStream* and then it fills the rest of the buffer space with zeros.

Input Signals

Number: 0

Type: Binary (DiscreteTimeDiscreteAmplitude)

Output Signals

Number: 1 or more

Type: Binary (DiscreteTimeDiscreteAmplitude)

Examples

Random Mode

PseudoRandom Mode As an example consider a pseudorandom sequence with *patternLength*=3 which contains a total of 7 ($2^3 - 1$) bits. In this sequence it is possible to find every combination of 0's and 1's that compose a 3 bit long subsequence with the exception of 000. For this example the possible subsequences are 010, 110, 101, 100, 111, 001 and 100 (they appear in figure 1 numbered in this order). Some of these require wrap.

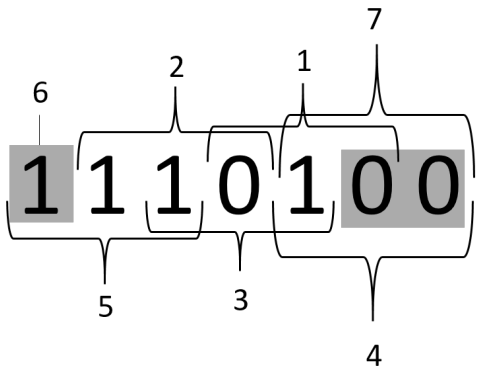

Figure 1: Example of a pseudorandom sequence with a pattern length equal to 3.

DeterministicCyclic Mode As an example take the *bit stream* '0100011101010101'. The generated binary signal is displayed in.

DeterministicAppendZeros Mode Take as an example the *bit stream* '0100011101010101'. The generated binary signal is displayed in 2.

Sugestions for future improvement

Implement an input signal that can work as trigger.

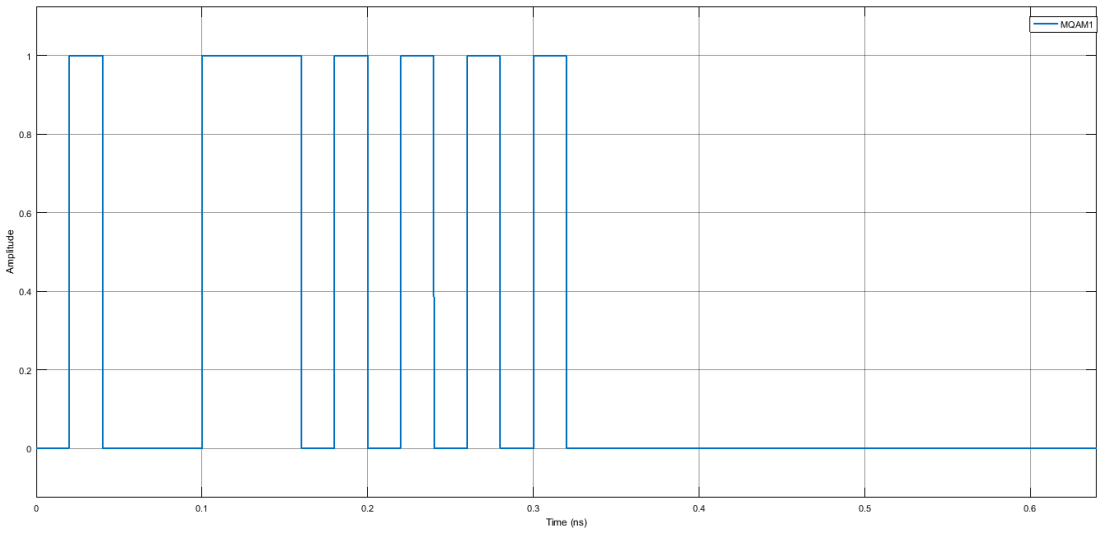

Figure 2: Binary signal generated by the block operating in the *PseudoRandom* mode