Binary Source

October 24, 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 a maximum of ??? output binary signals.

Input Parameters

- mode{PseudoRandom}
  (Random, PseudoRandom, DeterministicCyclic, DeterministicAppendZeros)
- probabilityOfZero{0.5}
  (real $\in$ [0,1])
- patternLength{7}
  (integer $\in$ [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

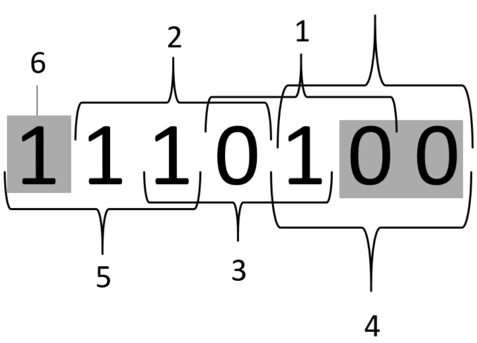
Number: 1 or more

Type: Binary (DiscreteTimeDiscreteAmplitude)

Examples

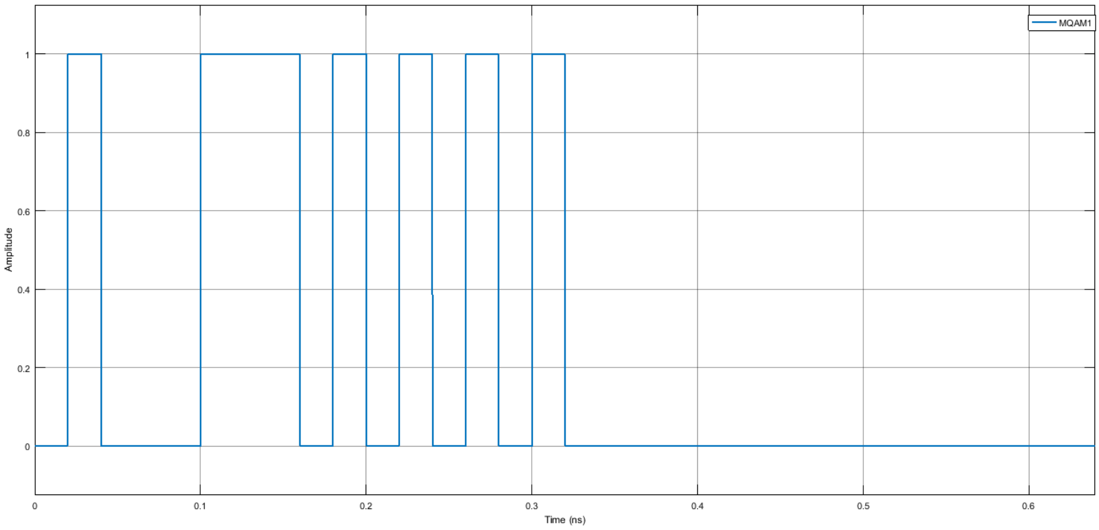
Random Mode

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 numbered in this order). Some of these require wrap.



DeterministicCyclic Mode

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



Sugestions for future improvement

Implement an input signal that can work as trigger.