

(1) Download and install software

ActivePerl (required)

Mathematica (optional for chemical reaction level ODE simulation)

COPASI (optional for chemical reaction level SBML simulation)

Visual DSD (optional for domain level visualization and simulation)

(2) Compile AND-OR-NOT circuit into AND/OR only circuit

Run in command line:

```
..\seesaw compiler>AONtoAO.pl circuitname
```

circuitname is the name of a circuit bench file (e.g. squareroot.txt)

```
..\seesaw compiler>AONtoAO.pl squareroot
```

A dual-rail circuit bench file will be generated: circuitname.dualrail.txt

(3) Compile AND/OR only circuit into seesaw circuit

Run in command line:

```
..\seesaw compiler>AOtoSEESAW.pl circuitname
```

circuitname is the name of a AND/OR only circuit bench file (e.g. fivegates.txt) or a dual-rail circuit bench file generated from step 2 (e.g. squareroot.dualrail.txt).

```
..\seesaw compiler>AOtoSEESAW.pl fivegates
```

```
..\seesaw compiler>AOtoSEESAW.pl squareroot.dualrail
```

A seesaw circuit file will be generated: circuitname.seesaw.txt

(4) Simulate seesaw circuit at chemical reaction level in Mathematica

Run in command line:

```
..\seesaw compiler>SEESAWtoODE.pl circuitname
```

circuitname is the name of an arbitrary seesaw circuit file (e.g. pulse.seesaw.txt), a AND/OR only seesaw circuit file generated from step 3 (fivegates.seesaw.txt) or a dual-rail seesaw circuit file generated from step 2+3 (e.g. squareroot.dualrail.seesaw.txt).

```
..\seesaw compiler>SEESAWtoODE.pl pulse
```

```
..\seesaw compiler>SEESAWtoODE.pl fivegates
```

```
..\seesaw compiler>SEESAWtoODE.pl squareroot.dualrail
```

A Mathematica package file will be generated: circuitname.seesaw.m

(5) Simulate seesaw circuit at chemical reaction level in a software that supports SBML (e.g. COPASI)

Run in command line:

```
..\seesaw compiler>SEESAWtoSBML.pl circuitname
```

circuitname is the same as step 4

```
..\seesaw compiler>SEESAWtoSBML.pl pulse
```

```
..\seesaw compiler>SEESAWtoSBML.pl fivegates
```

```
..\seesaw compiler>SEESAWtoSBML.pl squareroot.dualrail
```

A SBML file will be generated: circuitname.seesaw.sbml.xml

(6) Visualize and simulate seesaw circuit at domain level in Visual DSD

Run in command line:

```
..\seesaw compiler>SEESAWtoDSD.pl circuitname
```

circuitname is the same as step 4

```
..\seesaw compiler>SEESAWtoDSD.pl pulse
```

```
..\seesaw compiler>SEESAWtoDSD.pl fivegates
```

```
..\seesaw compiler>SEESAWtoDSD.pl squareroot.dualrail
```

A DSD file will be generated: circuitname.seesaw.dna

(7) Compile seesaw circuit into DNA sequences

Run in command line:

```
..\seesaw compiler>SEESAWtoDNA.pl circuitname
```

circuitname is the same as step 4

```
..\seesaw compiler>SEESAWtoDNA.pl pulse
```

```
..\seesaw compiler>SEESAWtoDNA.pl fivegates
```

```
..\seesaw compiler>SEESAWtoDNA.pl squareroot.dualrail
```

A DNA sequence file will be generated: circuitname.seesaw.sequence.txt