TOP

|  |  |  |  |
| --- | --- | --- | --- |
| Signal Name | I/O | Width | Simple Description |
| Num\_generations | I | 8 | Number of generations for EA |
| Self\_energy | I | 4 | Reading in Self\_energy Vector which depends on Num\_Particles |
| crossoverFraction | I | 8 | Crossover population depends |
| Interact\_energy | I | 4 | Reading in interaction Matrix which depends on Num\_Particles |
| latticeLength | I | 4 | Length of lattice |
| Num\_particle | I | 2 | Number of types of particle |
| Pop\_size | I | 8 | The number of population size |
| clk | I | 1 | Posedge triggered Clock |
| reset | I | 1 | Asynchronous negedge Reset |
| In\_valid | I | 1 | Indicate the data reading in is valid |
| Best\_ind\_in | I | 2\*16 | Receive the best individual from register file |
| Min\_fit\_in | I | 16 | Receive the best fitness from register file |
| Min\_fit\_out | O | 16 | The lowest fit of the individual |
| done | O | 1 | Done |
| Best\_ind\_out | O | 2\*16 | Best individual depends on number of particles |
|  |  |  |  |

Evaluate\_fit

|  |  |  |  |
| --- | --- | --- | --- |
| Signal Name | I/O | Width | Simple Description |
| Self\_energy | I | 4 |  |
| Interact\_energy | I | 4 |  |
| latticeLength | I | 4 |  |
| Num\_particle | I | 2 |  |
| Ind\_state | I | 2\*16 | All of state in a individual |
| clk | I | 1 |  |
| reset | I | 1 |  |
| In\_valid | I | 1 |  |
| start | I | 1 |  |
| Ind\_fit | O | 16 |  |
| Out\_valid | O | 1 |  |
|  |  |  |  |

Generate\_ind

|  |  |  |  |
| --- | --- | --- | --- |
| Signal Name | I/O | Width | Simple Description |
| Num\_generation | I | 8 | - |
| latticeLength | I | 4 | - |
| Num\_particle | I | 2 | - |
| Clk | I | 1 | - |
| Reset | I | 1 | - |
| Start | I | 1 | - |
| Ind\_state\_out | O | 2\*16 | State vector of individual related to lattice length and number of particles |
| Ind\_mutate\_rate | O | 8 | Int8 mutation rate |
| Out\_valid | O | 1 | - |
|  |  |  |  |

POP\_RF

|  |  |  |  |
| --- | --- | --- | --- |
| Signal Name | I/O | Width | Simple Description |
| Num\_generator | I | 8 |  |
| latticeLength | I | 4 |  |
| Num\_particle | I | 2 |  |
| Ind\_state\_in | I | 2\*16 |  |
| Ind\_mutate\_rate | I | 8 | Receive data from top module |
| crossoverFraction | I | 8 |  |
| clk | I | 1 |  |
| reset | I | 1 |  |
| In\_valid | I | 1 |  |
| start | I | 1 |  |
| Out\_valid | O | 1 |  |
| Min\_fit\_out | O | 16 | The lowest fit of the individual |
| done | O | 1 |  |
| Ind\_state\_out | O | 2x16 | Serves as the input for fitness function |
|  |  |  |  |

Only need while doing self\_adaptive

Sigma\_max

Sigma\_min