Random Oscillating Gate Interactions
TREND 2004
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Neural Network on a chip
- 5 volts power
- Connections accurate to 6 decimals
- 24-hour operation

Neural Network on a neck
- Burrito-powered
- Forgets home phone number
- Invented Neural Network on a chip
To test physical Boolean networks for their basic dynamics
applications

- Neurological networks
- Gene expression
- Chemical reactions
some graph theory
theory of oscillation

- Socolar predicts no aperiodic states will occur

- Differences between general theory and actuality
methods

- Evenly distributed high/low outputs
  - ie. X-OR, X-NOR, inverters

- Odd number

- Obvious oscillators

**FUNCTION TABLE**

<table>
<thead>
<tr>
<th>INPUTS</th>
<th>OUTPUT</th>
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<tbody>
<tr>
<td>A</td>
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</table>
oscillating loop

alternating high/low patterns
methods
- Evenly distributed high/low outputs
  - ie. ex-or, ex-nor, inverters
- Odd number
- Obvious oscillators
- Select random networks

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X-OR example

window.umd.edu-jaa 41>shuf 5

0 1 0 0 1
0 0 0 0 2
0 1 0 0 1
0 1 0 1 0
1 0 1 0 0
nine not gates hooked in oscillating loops
nine not gates hooked in oscillating loops
random networks

- Tend toward flat line states
- Must produce oscillators at some point
- Future: test more random gates
many thanks

John Rodgers
Nancy Boone
Ed Condon
Adam Cohen
And all of the “Lathrop Lab”