

Gerald Sussman and Biobricks

"And if we don't try, we're going to hit the tree too, just like everything else has."

The New Approach

- How can we compute?
- Right now we construct electronic circuit boards from iron ore and metallic alloys
- What about bacteria?
- They're messy and inconsistent but are nearly flawless when assembled together
- Significantly less expensive
- Need to harness power from these natural machines

Comparison

Electrical circuits

- Controllable/manipulatable
- We already know how to construct them
- Finite supplies
- Expensive

Biological circuits

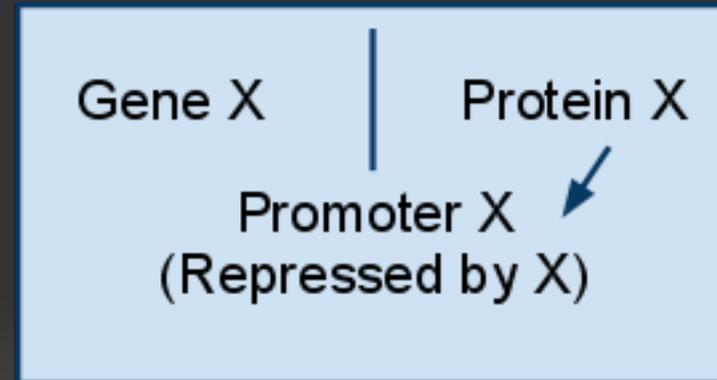
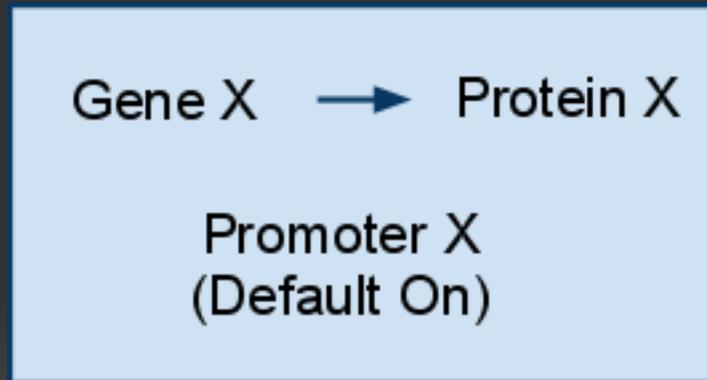
- Complex
- Evolve and adapt from failure
- Exist in nature
- Their power could potentially be harnessed
- Practically free

BioBricks

- Tom Knight of MIT
- Create a repository of circuit building blocks that can be linked together
- They do not affect the behavior of the cell, instead they direct it
- Goal: produce a synthetic living organism from standard parts that are completely understood

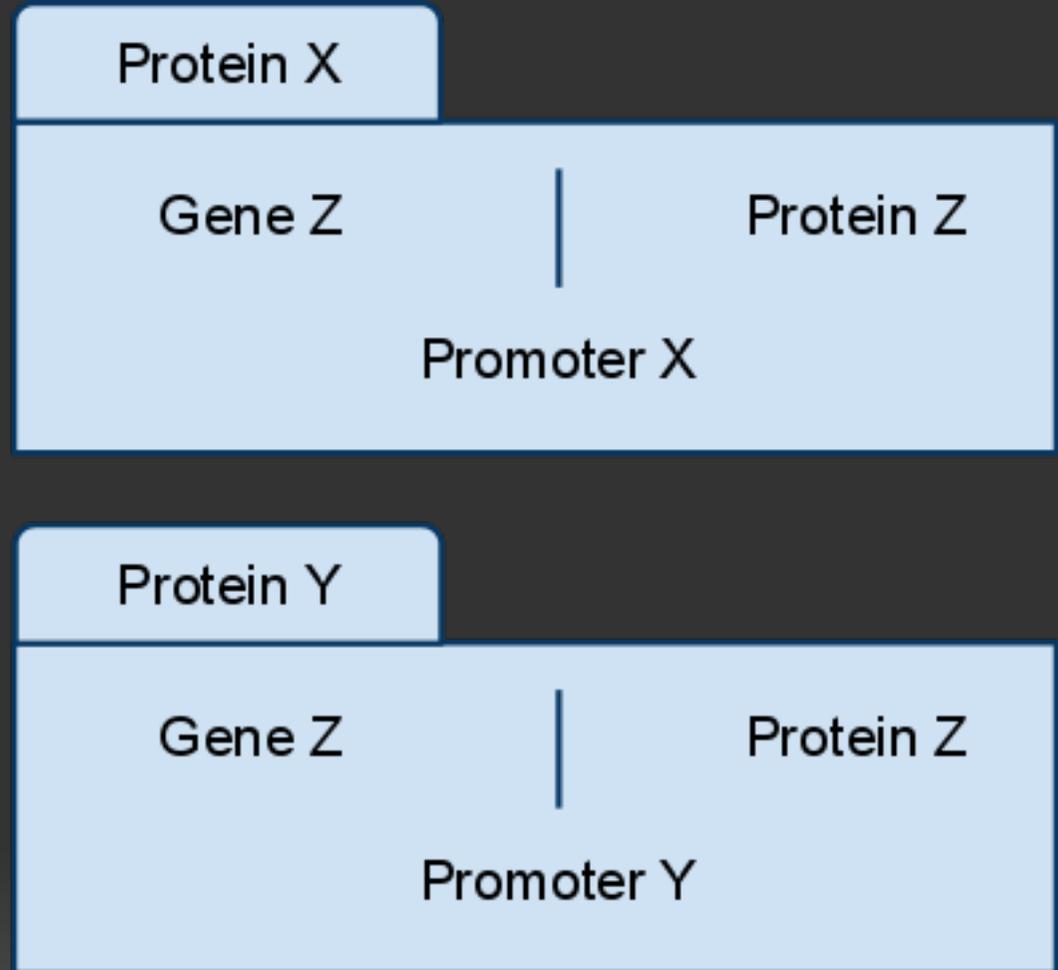
The Nitty Gritty

- Genes -> proteins
- Proteins -> promoters and repressors
- Any gene can be attached to any promoter
- Negative feedback circuit:



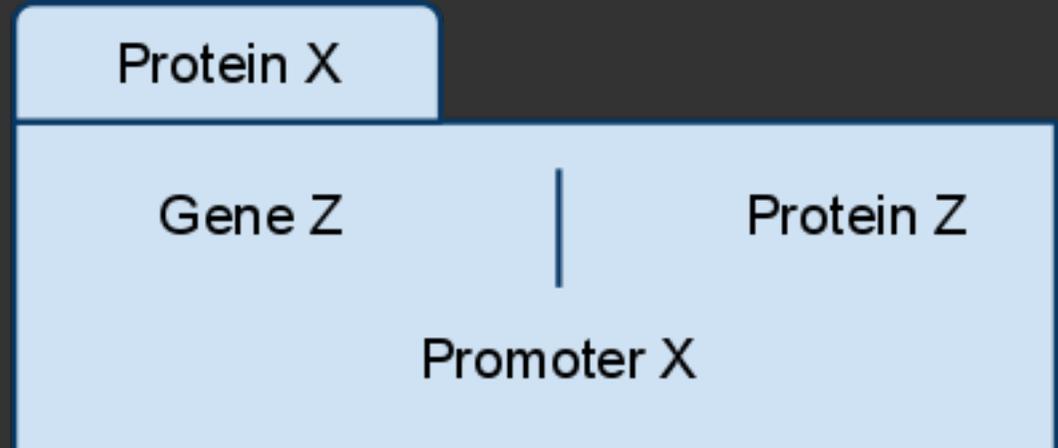
NAND Gate

In 1	In 2	Out
0	0	1
0	1	1
1	0	1
1	1	0

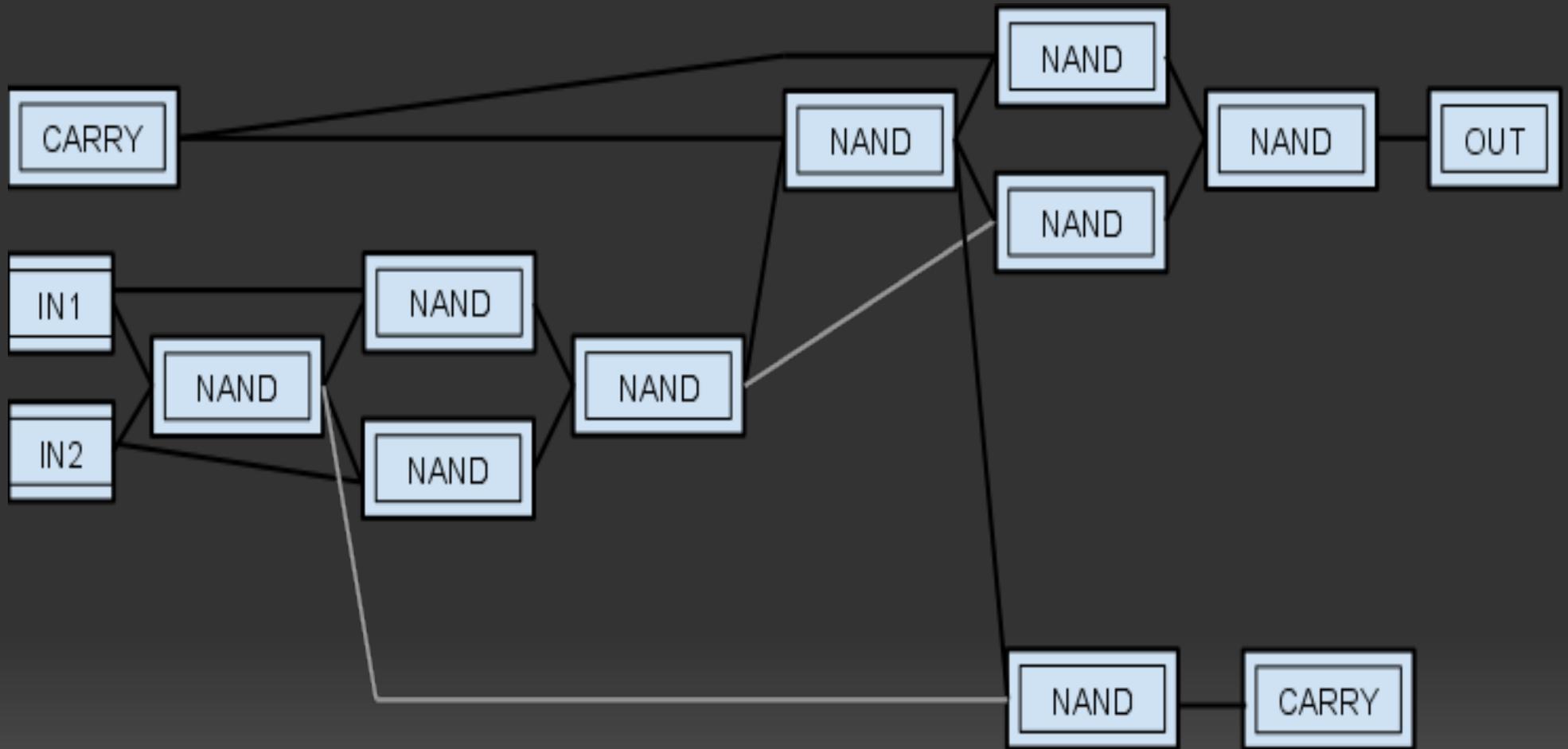


NAND Gate

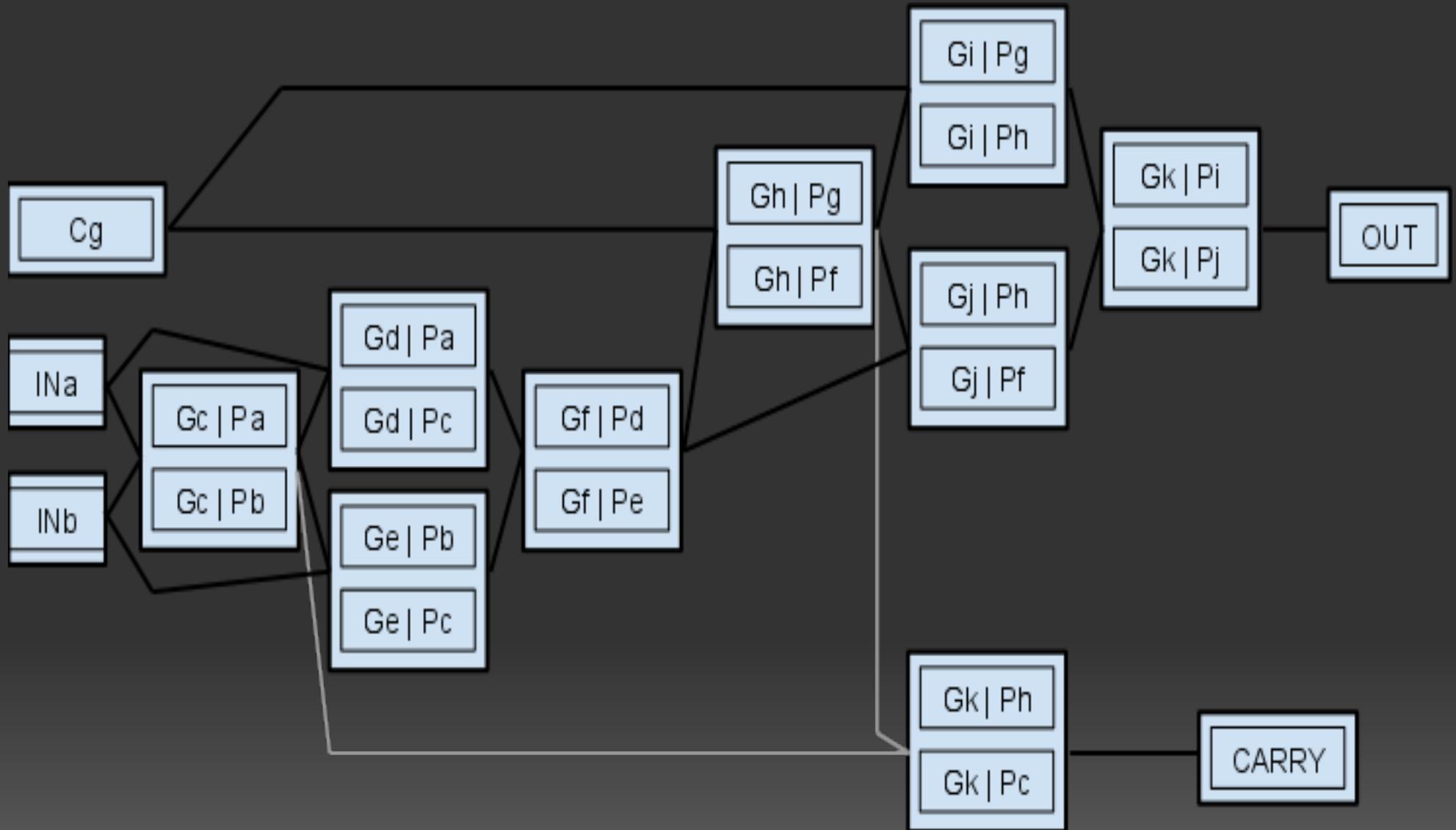
In 1	In 2	Out
0	0	1
0	1	1
1	0	1
1	1	0



Simple Adder



Simple Adder



Sources

<http://igem-victoria.pbworks.com/w/page/7992176/NAND-gate>

<http://www.brainmass.com/homework-help/electrical-computer-engineering/digital-logic-systems/79796>

<http://www.guardian.co.uk/science/2005/mar/10/science.research>