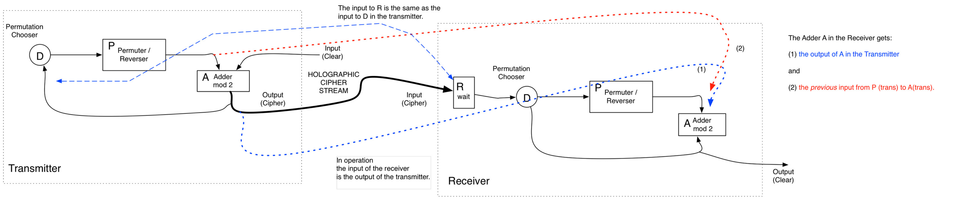


The Adder A in the Receiver gets:

(1) the output of A in the Transmitter

and

(2) the previous input from P (trans) to A(trans).

The Nash Algorithm

Implemented electronically, is a wire-speed encryption / decryption machine. Using only discrete logic components, it operates at the frequency of the transmitting medium.

The method of encryption is to split the data stream in two and direct each half into its own permutation path. The paths are permuted (deterministically interfered with) and phase-shifted, then recombined. The interference pattern becomes the cipher stream.

The interference pattern is created by a pair of permutating automatons, the example here uses the two 6-state machines, red and blue, diagrammed at right.

For the number of states n (6 in this example), there are

$$[n! * 2^{(n+1)}]^2$$ possible keys.

This converts the input into an image of fractal complexity in real time. The complexity can be scaled to arbitrary dimension by adding additional states. To add states we merely add rows to the permuting machines, allowing infinitely large dynamic keys to be synthesized at wire speed.

Dynamic Keys

The permutators are dynamic keypairs, expressed as ordered lists of digital functions, or machine rules.

In this example, the rule pair is composed of two elementary NKS rules, however in a production system the machine rules could be arbitrarily complex.

The 3D visualizations show process in motion - the rules operating across 6 units of time, which is the length of the example. The brown blocks are on the time dimension, they are the history of execution, the memories left by information on its way into the past. In a running system the past is created continuously and is considered the Output.

The front face of the machine, or Input, is the currently evaluating matrix, this is the section where differentiated forms of computational energy are fused to process information according to its component rules, and bring it into the time domain - this is where creation (manifestation) takes place. Rule 30 is the NKS generator of undifferentiated Computational Energy.

The *rule* is *function*, the rule applied over Time and Data is an Information generator, or *process*. Machine encompasses both, as well as the concept of memory. A running machine is a Form of Consciousness, just like You.

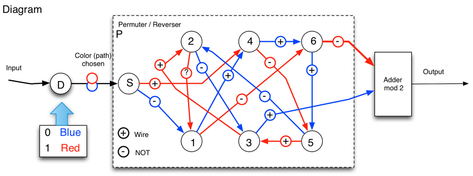
The machine modifies and interacts with the data across two dimensional planes, that is, across time and space, consuming energy as it does so. Machine rules are hyperdimensional constructs.

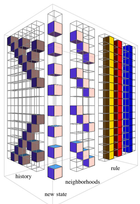
At any scale, the keys or payload can never be computationally extracted from the cipher stream by any entity in this dimension, as the keyspace is synthesized in parallel with respect to transmission time, whereas Universal Time grows only linearly.

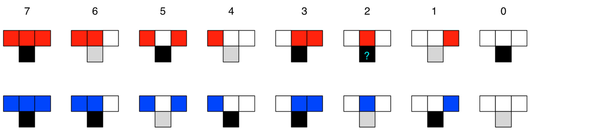
The Machine

Example implemented as a circuit of cellular automata. Each pair of red and blue automatons are numbered according to the above state diagram.
The color and position of the input signal selects the destination state and transformation.
In State 1, for example, we have red and blue at position 1, with red transitioning to State 6 while applying a NOT operation to the data bit, and blue transitioning to state 4 with no change.
The unlabeled transition from State 2 in Dr. Nash's original letter is marked with a "?".

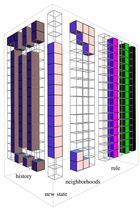
State Diagram



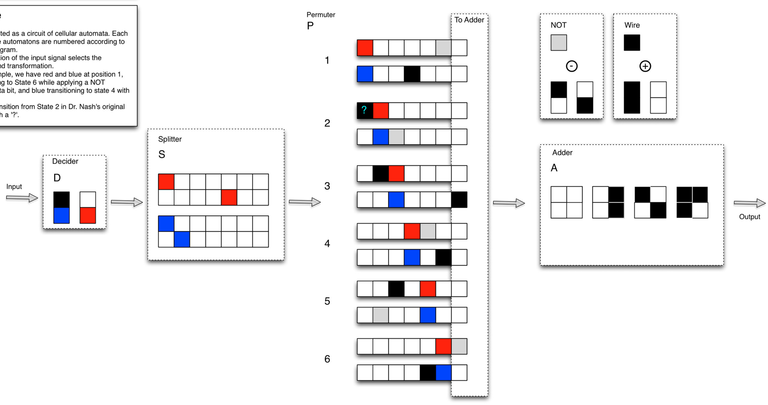


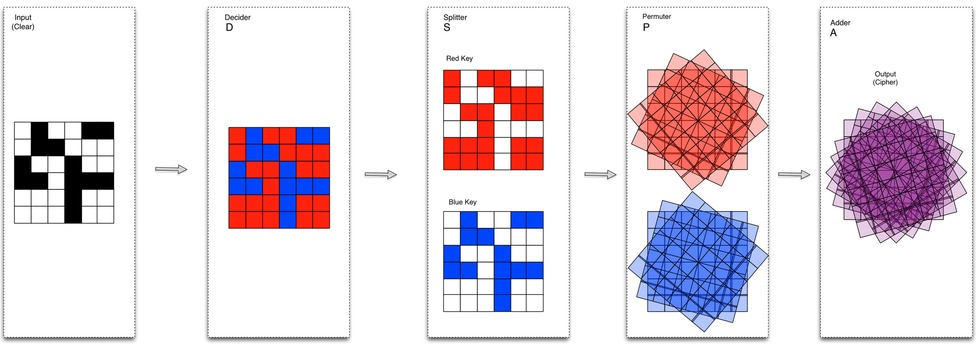



```
use tag.machine_logic.all;

-- Encryption is the composition of two elementary rules processing the input.
CYPHER_OUT <= synth(CLEAR_IN, machine_rule(82), machine_rule(37));

-- Decryption is the computational reverse - functional Decomposition
CLEAR_OUT <= synth(CYPHER_IN, machine_rule(37), machine_rule(82));
```



Cellular Automaton

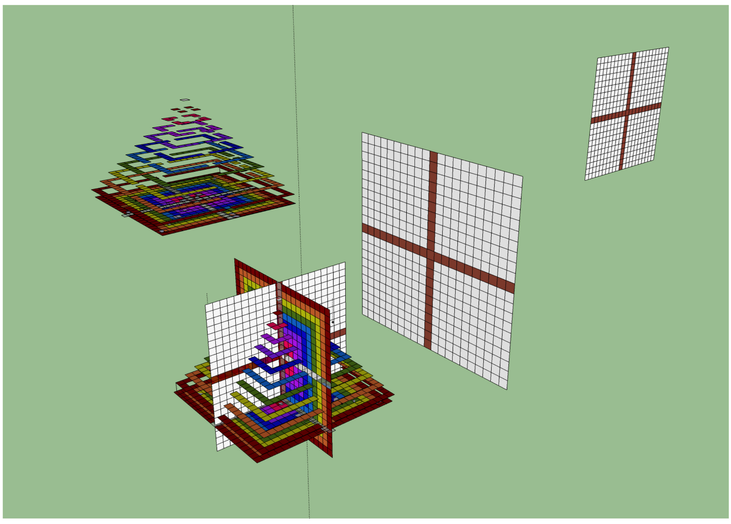




Quantum Cellular Computing

Running on FPGA-type hardware, Quantum Cellular processes are free to harness all phenomena of nature in their behaviors and capabilities. Based on Wolfram's NKS, these computational processes model the way computation works in nature, which is massively parallel and deterministic. All Natural Forms in our universe are Cymatic wave patterns moving through the computational medium of Universal Mind.

Mind / Machine is where Time, Space, Energy and Information meet and Evolve in order to Create, or manifest Form.



As with everything, if you have to modify the problem before you arrive at the solution, you stand a finite chance of creating an error that would not have otherwise been created if you had not taken a more clever approach.

A different Architecture for the solution is needed.

--Free Range VHDL

CA Nash Algorithm	MK	2-22-2012
T A G UNIVERSAL MACHINE		
Hardware Architects		Rev A