

## Self- Repairing Computer Memory

### The Problem

Space travel, aviation and military computing applications require non-volatile computer memory that may be exposed to damaging environmental conditions. Under adverse conditions, data can be lost from memory and life critical systems shut down.

A "Self Repairing" memory is therefore required that will continually return to its pre-programmed state.

### The Solution

In mathematics, it is known that;

- starting with a grid of cells that are either black or white (on or off),
- given a set of rules that determine cell colour based on the colour of neighbouring cells,

and

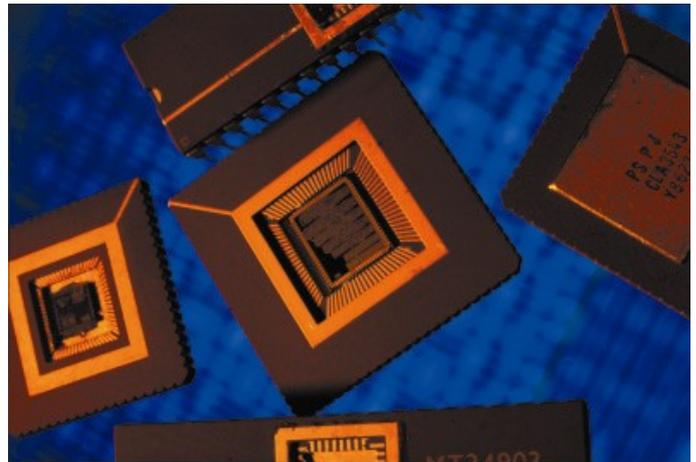
- applying those rules to each cell in turn,
- then
- a pre-determined pattern will emerge.

The final pattern is defined only by the set of rules, not by the starting pattern on the grid. This means that whatever damage occurs to the pattern, the pre-determined pattern will always return. These systems are widely known and referred to as Cellular Automatas (CAs).

The practical application of CAs has been restricted due to the difficulty of predicting what pattern will be produced by what specific rule set. But now, Engineers at Durham University have created software and methods that can interrogate a pattern (and other variables) to predict what rules are required to create it as a stable end-point pattern. This rule-creator opens the door to many practical applications of CA's.

One such as application is data storage in electronic circuits. With data forming a pattern of cells with a value of 0 or 1, the Durham rule-creator will create CA rules. Each cell contains the rule and therefore has the ability to use it in conjunction with its neighbour status to recreate the complete pattern of data. By continually running the rules, the data pattern is continually refreshed and "Self-Repaired".

This principle is seen in living cells whereby each cell behaves according to rules contained within its DNA and influences from its neighbouring environment.



***By applying a simple set of rules, a pattern of 0's 1's emerges (e.g. Computer Data). A particular rule will create a particular end point pattern and will allow computer data to be continually refreshed.***

### The Opportunity

The research work to date has created a substantial quantity of Intellectual Property (IP) in the form of know-how and expertise. A patent has been applied for (GB0802245.1) "Self Repairing Electronic Data Systems" 07-02-08.

Durham University wishes to advance the research and work with an R&D company to advance the creation of a specific memory application for space travel, air travel or defence applications. Licensing arrangements with R&D companies would also be welcome.

### For more information

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