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Keeping your data safe for the future

Digital data storage in a self-error-detecting DNA encoding and decoding system

Innovation and Customer Benefit

We live in the era of information and digitalization, so the need for data storage increases constantly. This poses a significant and urgent problem, namely the storage of big amounts of data in a reliable, stable, safe and cost effective medium.

Current electronic devices (based on planar layer) show limitations on data storage density and long-term capabilities.

This invention presents a new coding and decoding procedure, which offers the following advantages:

- Higher data storage density
- Increased storage longevity
- Greater tolerance to high error rates by synthesis & sequencing of DNA.
- No biological activity: safety of use

Possible Applications

The invention can be applied using current DNA synthesis methods, which produce multiple copies of each DNA fragment.

This coding system also limits high, undesired GC content and allows a simple secondary structure.

The nature of DNA makes it storable for hundreds of years with a high reliability.

Technical Description

This new DNA digital data encoding system assigns a base pair to each group of four bits. A third, error-detecting base is additionally allocated according to a two-level rule.

The content of GC has been limited to <66,7% and homopolymers have a maximum length of 6 bp.

The decoding process has been created so that with only five individual copies of a DNA fragment, 1% error in the synthesis is tolerated. With the number of copies usually produced with current DNA-Synthesis methods, the error tolerance increases up to 40%. This rate cannot be achieved with any other coding system.

DNA might be biologically active, so safety becomes an issue. The limitations imposed to the encoding system, which includes numerous codons that are rarely used in nature, make the sequences created biologically not meaningful.

Some simple, even portable DNA sequencers have been recently developed, which present a higher error rate than traditional systems. The present encoding system is the only available that can tolerate such error rates, allowing a fast and safe data storage and reading.

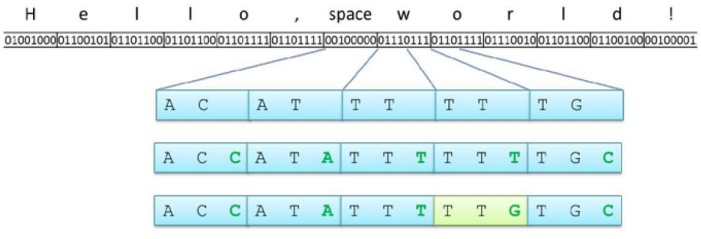

Fig. 1: Example of binary data encoding in DNA string, including the error-detection mechanism.

Focus Sectors

- IT, digitalization
- DNA synthesis
- DNA sequencing
- Synthetic biology

Project Key Words

- High data storage density
- High error tolerance
- Increased longevity
- Biological safety

Development Status

- Proof of concept

Patent Procedure Status

- Patent application filed

Chances for Cooperation

- Licensing
- Patent Sale
- R&D Cooperation

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