

DNA-based Solutions for Data Storage and Computation

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CTO

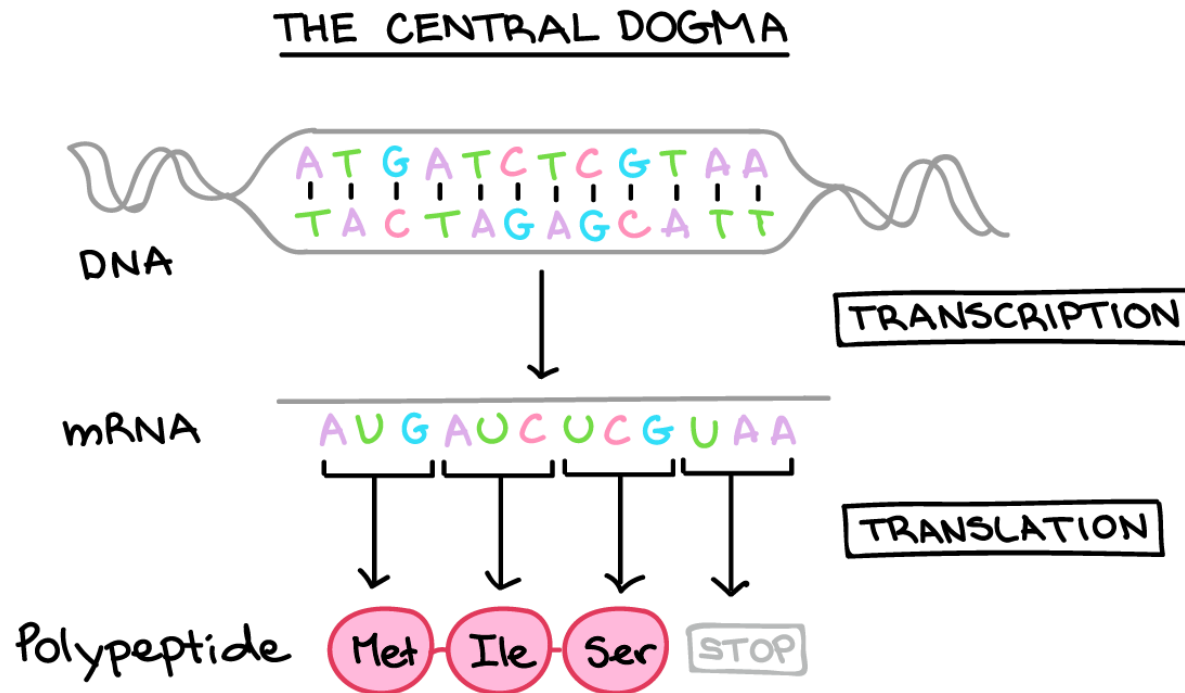


CATALOG

Hyperion Conference

December 13, 2022

Intuitive symbolic system for digital data storage in synthetic DNA



Synthesize: **AAGTC**



System of symbols:
00=A, 01=T, 10=G, 11=C

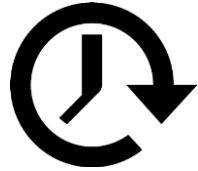


Data: **00 00 10 01 11**

DNA allows scale-free computing



DNA is 1,000,000x more **information dense** than solid state disk (SSD)



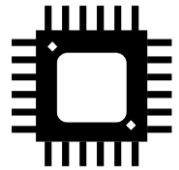
DNA is **stable** for hundreds and even thousands of years



Even massive data sets can be **easily replicated** into multiple copies

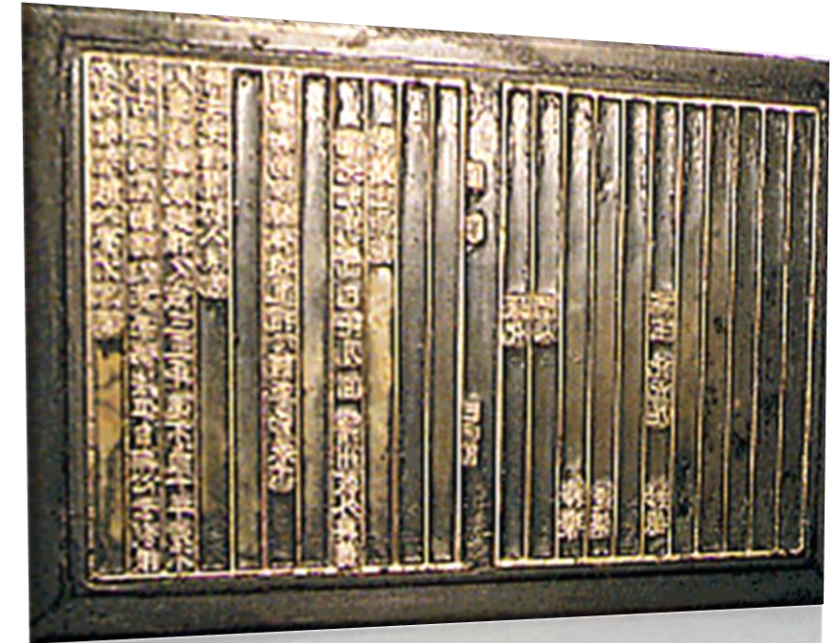
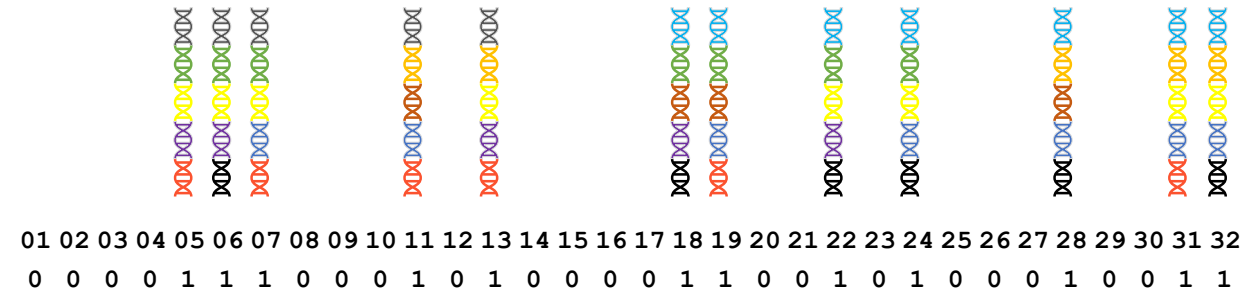
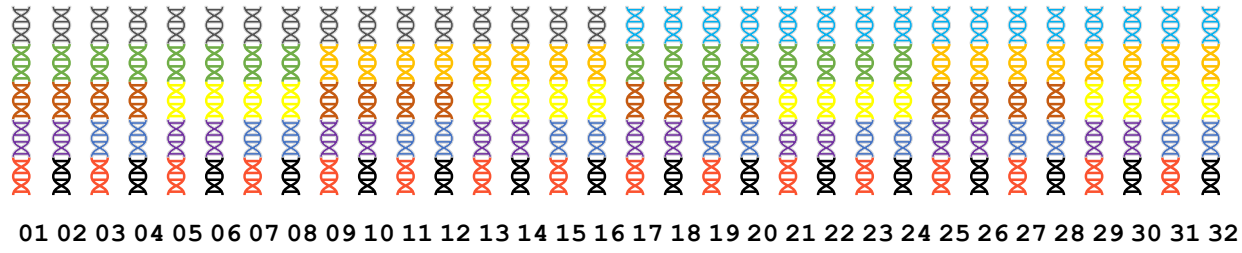


DNA will **always be readable**. Retrieval times will only improve over time as sequencing technology improves



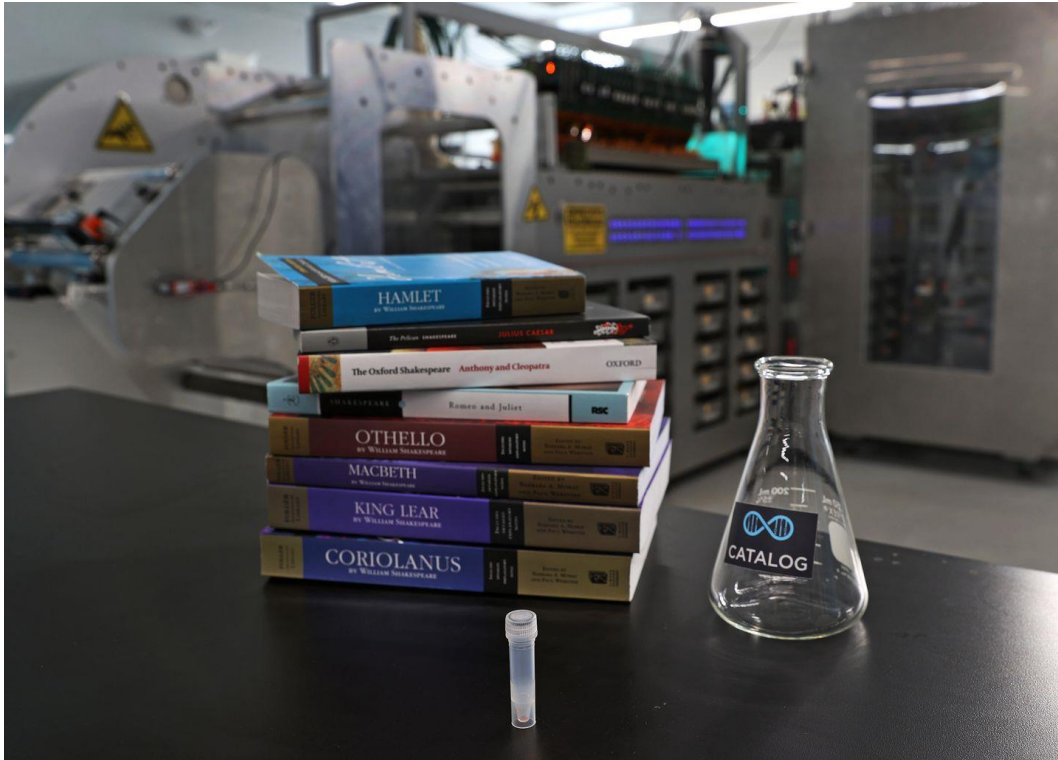
True in-storage computing. **Massively parallel**, low-power, and non-volatile computing

A new Symbolic system for digital data storage in synthetic DNA: CATALOG Combinatorial Scheme

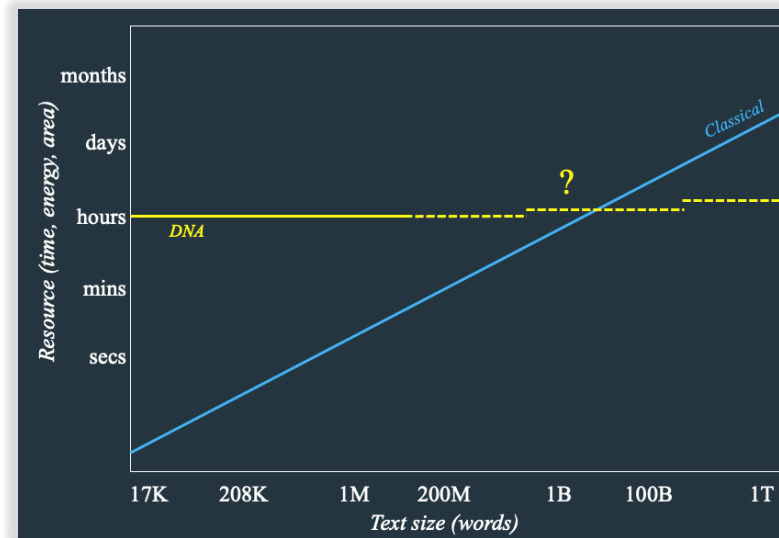


Oldest movable metallic type "Jikji" from 1377

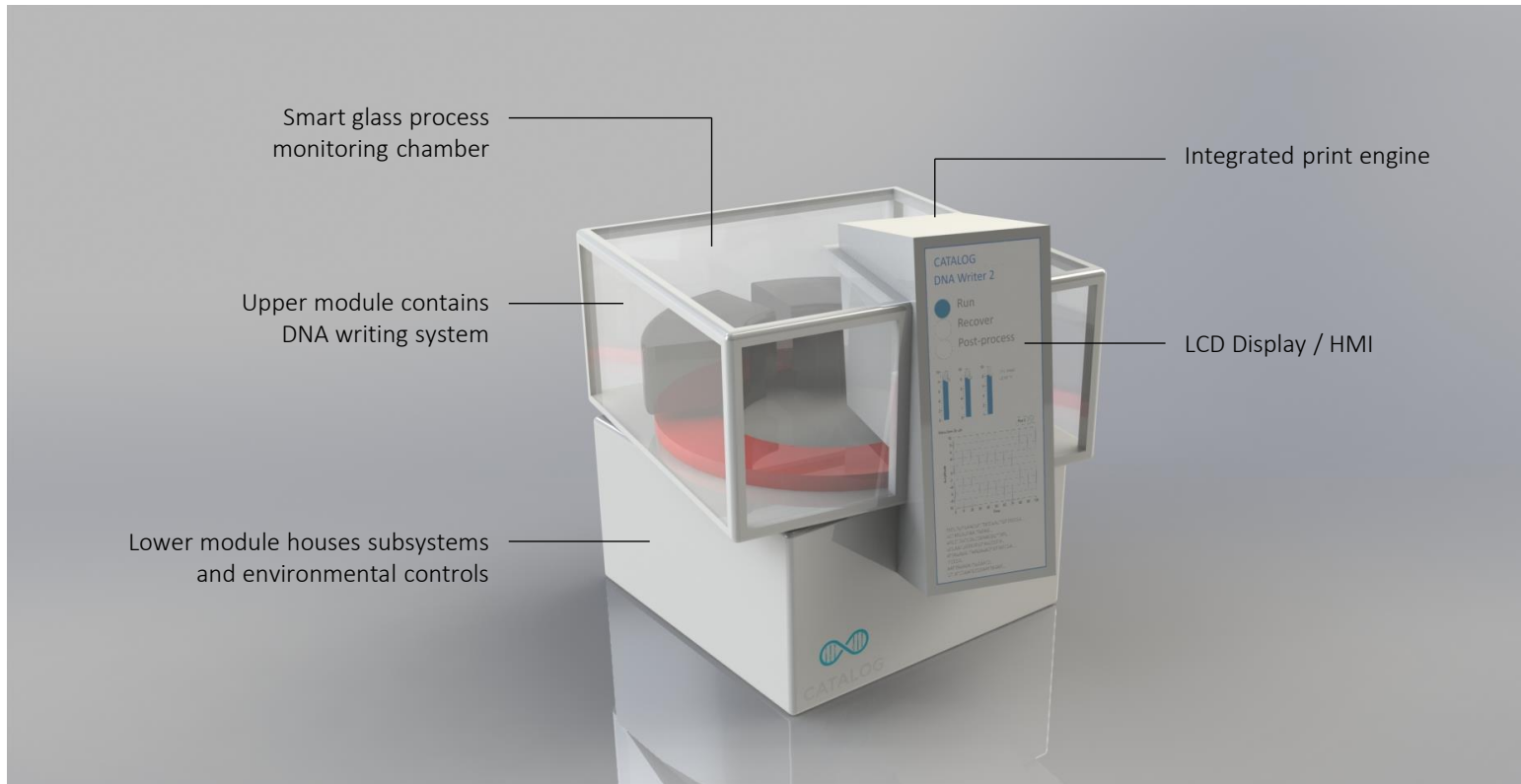
Announcement on Monday



- Encoded 8 Shakespeare Tragedies into DNA
 - 207,000 words
 - No preprocessing, indexing, etc.
- Successfully searched for all occurrences of the word “lord” (685)
- DNA search appears to be time invariant with respect to data volume (at least up to 100M words)
 - Classical Computer is $O(N)$
 - Quantum is $O(N^{1/2})$



Single DNA writer overview

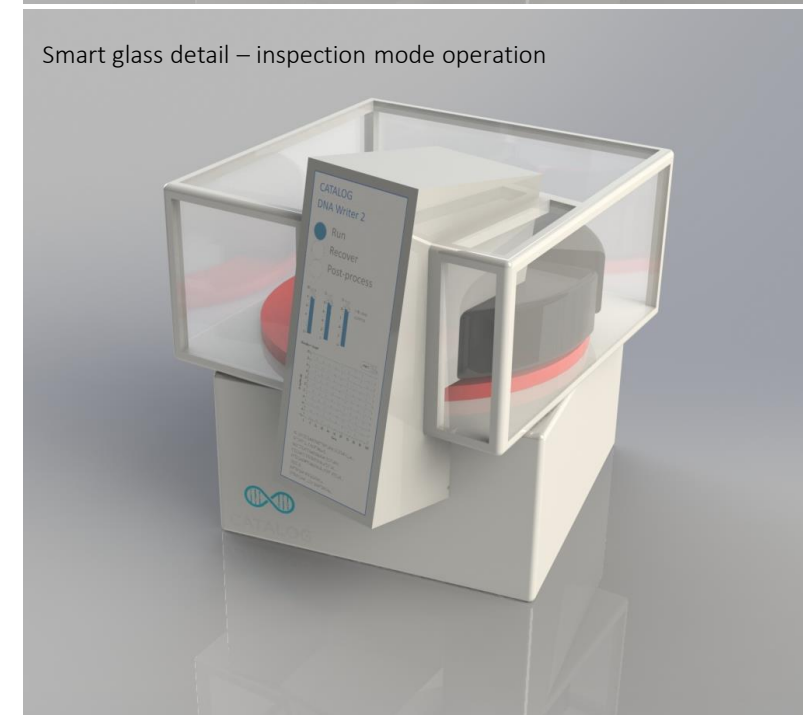


Approximate dimensions: 1180 × 1180 × 1300 mm (L × W × H)

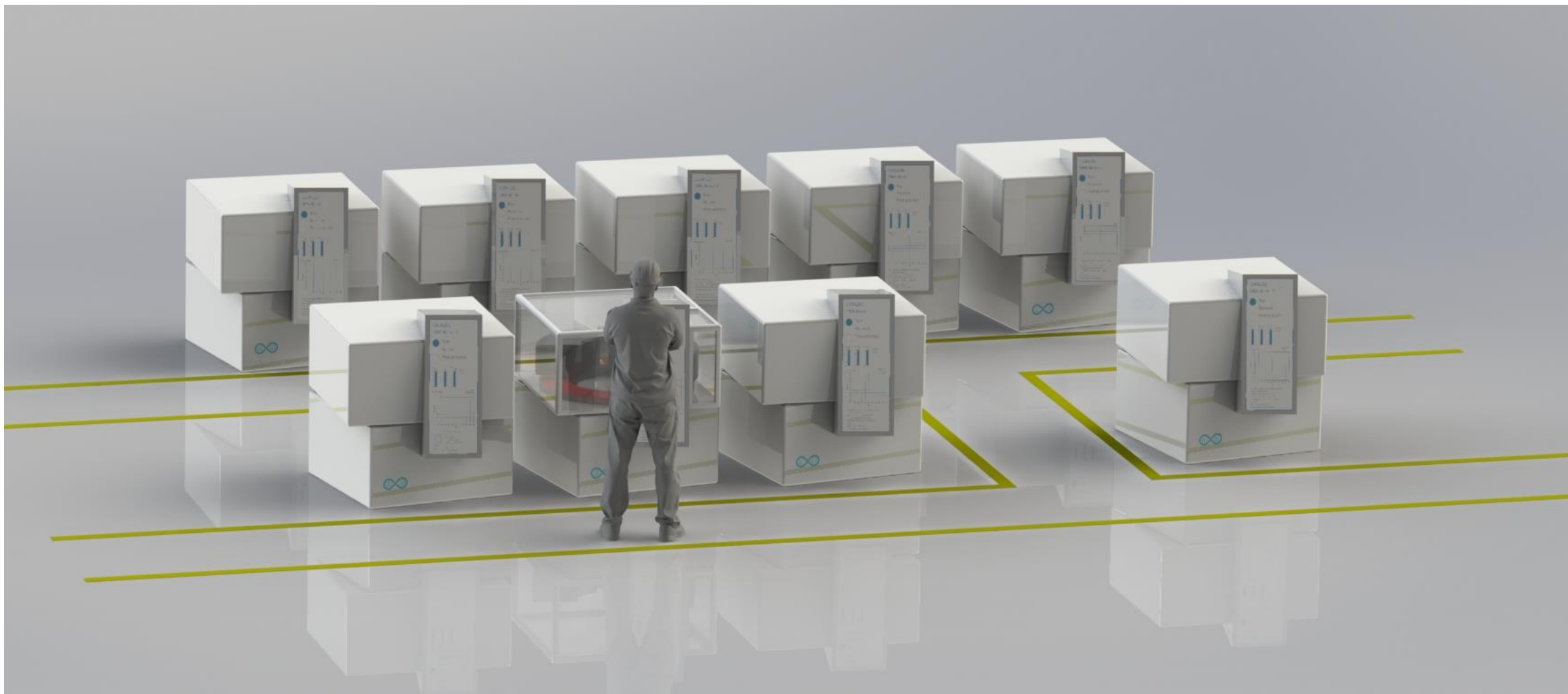
Smart glass detail – normal writing operation



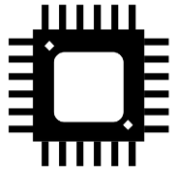
Smart glass detail – inspection mode operation



Factory layout



Applications are currently under development



True in-storage
computing. Massively
parallel, **low-power**,
and non-volatile

Current Users & Collaborators

Oil & Gas Supermajor



Modeling & Optimization

Defense



Database Search & Inference

Finance



Signal Processing

Media & Entertainment



Storage of Media Assets

A new industry is being born

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Technology alliance boosts efforts to store data in DNA

Trade group aims to advance technologies for storing big data.

