Fault Tolerant NanoBoxes for Designing Computers Using Molecular Nanotechnology

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ARCTiC Labs www.arctic.umn.edu
DNA Scaffold

Proposed DNA Scaffold

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DNA Scaffold with Circuit Map

Proposed DNA Scaffold with Circuit Mapping

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Logic Blocks From DNA Scaffold

Becomes...

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FT Nano Architectures

Approach to use external hardware to identify and route around faulty blocks

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FT Nano Architectures

NanoBox approach incorporates fault tolerant techniques into black box components

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NanoBox Virtues

➢ Abstraction makes circuit design easier
➢ NanoBox can be abstracted at varying levels of detail
➢ Fault identification and correction is deterministic
NanoBox Vices

- NanoBox interconnection errors not accounted for
- Keeping distributed FT overhead within reason will be challenging
NanoBox Future Work

- At what level to abstract?
- Start thinking about inter-NanoBox errors
In Summary

- Intro to our Molecular Technology
  DNA Scaffolding
- Progress to date with DNA Scaffolding
  Assembled rafts with gold clusters and attached rafts to mica
- Future architecture direction
  Encapsulated fault tolerance with self−healing NanoBoxes
Questions and Discussion