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NanoPort: Digital Library techniques for a multidisciplinary domain

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Artificial Intelligence Lab

The University of Arizona

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Introduction

- Request from Dr. Mihail Roco of the NSF National Nanotechnology Initiative
 - Develop a specialized search tool to address the information-seeking needs of those in the domain
 - Investigate the impact of such a search tool on the community and explore possible new directions



Introduction

- Nanotechnology is new and growing quickly, the Web has become an important medium for researchers and practitioners seeking up-to-date information
- The domain encompasses different research perspectives, languages, and application areas
- Problems of information overload, fluidity of concepts



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Nanotechnology

Optics

Chemistry Environmental Engineering

Cell Biology

Biomedical Engineering

Mechanical Engineering

Computer Engineering

Bioengineering

Environmental Science

Physics

Materials Science

Chemical Engineering

Astronomy

Neurobiology

Electrical Engineering

Biochemistry





Research Question

- ✍ Can techniques originally developed for the medical domain be applied to a unstructured domain such as nanoscale science and engineering?



User Requirement Study

- 15 faculty researchers at The University of Arizona, 2 Industry and 1 NSF researcher
- Across disciplines: Materials Science, Chemistry, Biomedical Engineering, Physics, Optics



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User Requirement Study

- Databases
 - Math Preceptor Group
 - Math Preceptor Group Office
 - Math Preceptor Group
- Full text
 - Proceedings of the National Academy of Science
 - Materials Technology Review
- News
 - Small Business
 - Small Business
- Search engines
 - Scirus
- Funding sources
 - NSF NIH
 - National Center for Research
- Research Centers
 - Bio Technology Information
- Industry
 - Advanced Nano Products



Challenges

- fee-based databases
 - Z39.50
 - Nature
- fitting a large amount of information on one interface

NanoPort - Microsoft Internet Explorer

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NanoPort

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Quick Search

Search Results Analyze results Visualize results

Keyword(s):
nanocomputer

Please put each of your search terms on a new line. To move the cursor to the next line in the text box, press the Enter key.

Search Reset

Search Engines	Databases	Journals
<input type="checkbox"/> All Search Engines	<input type="checkbox"/> All Databases	<input type="checkbox"/> All Journals
<input checked="" type="checkbox"/> NanoPort NanoPort is a search engine created specifically for the domain of nanoscale science and engineering. It was developed by the Artificial Intelligence Lab at the University of Arizona. Over 100,000 quality pages are indexed.	<input checked="" type="checkbox"/> MedLine MedLine is the National Library of Medicine's premier bibliographic database of international biomedical literature. It includes links to many sites with full text articles and provides access to over 11 million MedLine citations back to the mid-1960's.	<input checked="" type="checkbox"/> Science The electronic version of the Global Weekly of Research, published by the American Association for the Advancement of Science, provides journal archives starting from October 1995.
<input checked="" type="checkbox"/> NanoSpot Nanospot is a targeted search engine for nanoscale science, technology, and engineering. Nanospot is designed to search only the best nanotechnology sites on the web, indexing the contents of over 25,000 carefully selected sites.	<input checked="" type="checkbox"/> US Patent The US Patent and Trademark Office (USPTO) database provides full-text search to millions of patents starting from 1976.	<input checked="" type="checkbox"/> MIT Technology Review Technology Review has long been the MIT's magazine of science and technology innovation. The online version contains archive issues starting from January 1997.
<input checked="" type="checkbox"/> Scirus Scirus currently covers more than 89 million	<input type="checkbox"/> MatWeb MatWeb, the materials information database with data on more than 26,000 materials including metals, plastics, ceramics, and composites.	<input checked="" type="checkbox"/> PNAS The Proceedings of the National Academy of the Sciences publishes cutting-edge research reports, commentaries, reviews, perspectives, colloquium papers, and

Input keywords

Select search engines

Select online databases

Select online journals



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NanoPort - Microsoft Internet Explorer

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NanoPort Top 20 results [back to top](#)

1 [Fractal Nanocomputer Designed!](#)
Summary: (You need to ensure that there are some cubes in the structure that posses both smaller and larger interfaces to allow the two different scales of computers to mix.) Providing the smaller robotic cubes retain the same functionality as the larger computers then you can expand the power of the collective

Summarize it in sentences

2 [Fractal Shape Changing Robot Nanocomputer Architecture](#)
Summary: (You need to ensure that there are some cubes in the structure that posses both smaller and larger interfaces to allow the two different scales of computers to mix.) Providing the smaller robotic cubes retain the same functionality as the larger computers then you can expand the power of the collective

3 [Team uses groupware to build nanocomputer on the Net](#)
Summary: The other teams are Yellow, the "brainstorming" team, charged with problem formulation and solution; Green, for physical hardware construction; Blue, for blueprint design; the Purple "Molecular Modeling" team for visual and chemical analysis; the Orange "Net Supercomputing" team to coordinate distributed

Summarize it in sentences

4 [nanocomputer](#) [The Jargon Dictionary]
Summary: The Jargon Dictionary- <http://info.astrian.net/jargon/terms/n/nanocomputer.html>
The Jargon Dictionary: Terms: nanocomputer nanocomputer
nanocomputer /n- k* m-pyoo'tr/ n.

Summarize it in sentences

5 [NanoComputer Dream Team - About Us](#)
Summary: This debate quickly took on a life of its own, as positive voices from around the world asked "why not now?" The Nanocomputer Dream Team spontaneously self-assembled from the ensuing intellectual dialogue, and through the power of the Internet, talent from all over the world, in every scientific field,

Summarize it in sentences

6 [sci.nanotech Archives: Is a Nanocomputer possible in 10 years given enough funding?](#)
Summary: Tihamer (Tee) Toth-Fejel Office: 313 594-2165 Home: 810 229-0040 Fax: 313 594-7837 Concept 2010 Design Studio, Ford, Dearborn, Michigan.

Summarize it in sentences

Summarize result dynamically



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NanoPort Summarizer - Microsoft Internet Explorer




Summary in 3 sentence(s)

- The other teams are Yellow, the "brainstorming" team, charged with problem formulation and solution; Green, for physical hardware construction; Blue, for blueprint design; the Purple "Molecular Modeling" team for visual and chemical analysis; the Orange "Net Supercomputing" team to coordinate distributed computing resources; and the White "PR" team for media and information coordination.
- "I am currently looking for experts in rod logic, fuzzy logic, reversible logic, gear logic and helical logic in order to get a broad enough base of expertise so that every aspect of nanocomputer logic design will be within the competency of the team," said Red-team leader Parfitt.
- Just as computer art is composed of 2-D pixels, fractal robots are composed of 3-D cubes -- thousands of them, from those measuring 1 meter on a side for creating building-size robots to those measuring 1 cubic micron for delicate eye-surgery robots.

Close Summarizer

Original Page



Team uses groupware to build nanocomputer on the Net

By R. Colin Johnson

RICHMOND, Va. -- An ad hoc group of scientists that includes at least one Nobel-prize winner has come together on the Internet to build the world's first nanocomputer using groupware in cyberspace. The professed goal of the "Nanocomputer Team" is to build, by the year 2011, a computer that's made out of molecules--one "grown" from tiny adding machines that consist of just hundreds of atoms.

So far, the Dream Team has amassed the brainpower of seven working engineers and scientists, all of whom volunteer their time to designing and proceeding with computer principles.

"The Nanocomputer Team is an organization with the mission of building the first nanocomputer at least a close second," said Darrell Parfitt, captain of the project's Red team, which is evaluating logic models, from molecular "rod" logic to quantum-dot automata.

The other teams are Yellow, the "brainstorming" team, charged with problem formulation and solution; Green, for physical hardware construction; Blue, for blueprint design; the Purple "Molecular Modeling" team for visual and chemical analysis; the Orange "Net Supercomputing" team to coordinate distributed computing resources; and the White "PR" team for media and information coordination.

Summary

Click on the summary sentence and jump to its position in the original page

The summary is highlighted in the original page with the corresponding color



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[Search](#)

Keywords: nanocomputer **Results from:** [NanoSpot](#) | [MedLine](#) | [Scirus](#) | [USPTQ](#) | [NanoPort](#) | [Science](#) |

NanoSpot Top 20 results [back to top](#)

- [main](#)
Summary: vollkommen neue Eigenschaften. Die Medien haben die Nanotechnologie als Thema entdeckt: Nanoroboter, Nanocomputer und sich selbst reproduzierende Nanomaschinen sind die interessantesten ...
Summarize it in sentences
- [Foresight Update 22 Page 5](#)
Summary: of various achievements in the field. The events selected were first molecular assembler, first nanocomputer, first cell repair machine, first commercial product, and first nanotechnology-oriented ...
Summarize it in sentences
- [Unbounding the Future: Chapter 2](#)
Summary: 1D. Your simulated body is 50 nanometers tall, about 1/40,000,000 your real size, and the smaller nanocomputer is twice your height. At that size, you can "see" atoms and molecules, ...
Summarize it in sentences
- [Nanomedicine Art Gallery - Image 110](#)
Summary: submarine that would navigate its way through the bloodstream. In that submarine would be a powerful nanocomputer. This computer would be programmed to seek out and destroy disease-causing ...
Summarize it in sentences
- [Respirocytes](#)
Summary: arranged structural atoms plus 9 billion temporarily resident molecules when fully loaded. An onboard nanocomputer and numerous chemical and pressure sensors allow the

Folder display

Visualization with SOM



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Search Results Analyze results Visualize results

Keywords: nanocomputer

- Art Gallery (4 docs)
- built in fractal (2 docs)
- Designs for mechanical nanocomputers (3 docs)
- larger computers (2 docs)
- mechanical nanocomputers (10 docs)
 - jargon_node: nanocomputer (NanoPort)
 - Jargon 4.2_node: nanocomputer (NanoPort)
 - jargon_node: nanocomputer (NanoPort)
 - nanocomputer (NanoPort)
 - Jargon - nanocomputer (NanoPort)
 - Jargon File 3.0.0 - nanocomputer (NanoPort)
 - nanocomputer (NanoPort)
 - nanocomputer (Scirus)
 - nanocomputer (Scirus)
 - nanocomputer (Scirus)
- molecular-sized switching elements (3 docs)
- nanocomputer designs (8 docs)
- nanocomputer dream team (17 docs)
- NanoComputer DreamTeam Inc (2 docs)
- nanofortnight nanocomputer (3 docs)
- NON-PROFIT International (6 docs)
- Project Development (2 docs)
- repair machine (2 docs)
- robotic cubes (2 docs)
- scales of computers (2 docs)
- single molecule sliding rods (10 docs)

Internet

Folder display



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Visualization using SOM

The screenshot shows a web browser window with the address bar containing "servlet/nanoport?event=dynamicSOM - Microsoft Internet Explorer". The main content area is divided into two parts. On the left is a SOM map visualization, which is a large green rectangle with a smaller blue rectangle in the bottom right corner. The green area is labeled "+nanocomputer dream team [46]" and the blue area is labeled "mechanical nanocomputers [10]". Below the map is a button labeled "Close SOM Map". On the right is a list of documents under the heading "Region Name: nanocomputer dream team 46 docs". The list contains eight items, each with a number, a title, and a source:

1. [4,734,856: Autogeneric system \(USPTO\)](#)
2. [6,256,767: Demultiplexer for a molecular wire crossbar network \(MWCN DEMUX\) \(USPTO\)](#)
3. [Exploratory design in medical nanotechnology: a mechanical artificial red cell. \(MedLine\)](#)
4. [Foresight Update 2 Page 3 \(NanoSpot\)](#)
5. [nanorevolution.com \(NanoSpot\)](#)
6. [Unbounding the Future: Glossary \(NanoSpot\)](#)
7. [A Molecular Latch for Digital Logic \(NanoSpot\)](#)
8. [Respirocytes: A Mechanical Artificial Red Cell TOC \(NanoSpot\)](#)