SCIENTIFIC APPLICATIONS OF THE CONNECTION MACHINE pdf

1: Scientific | Coherent

This book contains the proceedings of the conference on Scientific Applications of the Connection Machine. Included are the following articles: A Connection Machine Implementation of Tracer.

Coherent lasers not only enable you to get better data, they enable your lab to produce more data. Join the Industrial Revolution in Ultrafast Science Scientific research is highly demanding and competitive. Reproducible results and exceptional reliability reduce your cost of data and accelerate your career. Click on the thumbnail to learn more about how Coherent scientific ultrafast lasers are designed and built for industrial-grade reliability. Generally, ultrafast spectroscopy refers to pump-probe experiments using picosecond or femtosecond lasers to get time-resolved spectral information. Traditionally ultrafast spectroscopy was restricted to gas phase reactions, where molecules are considered to be isolated. It is therefore easier to distinguish spectral features and energy transfer mechanisms than in condensed phase systems. These experiments have lead to an ever increasing knowledge of gas phase reactions resulting in quantum control of reactions in the gas phase. Since the development of reliable solid-state ultrafast lasers over 10 years ago, ultrafast spectroscopy is not limited to gas phase reactions. The ability to choose pulsewidth, wavelength, or amplify the traditional Ti: S output means ever more increasing applications in condensed phase systems as well. There are numerous processes that occur in the far-infrared FIR region of the spectrum that have not been studied directly due to the lack of availability of ultrashort FIR pulses. Attention has been focused on generating these THz pulses and understanding the physics of generation and propagation; now the actual THz pulses can be used as a spectroscopic tool. THz spectroscopy has applications in semiconductors, liquids, gases and 2-D imaging. Imaging is rapidly emerging as an exciting THz application, and images can be taken using transmission or reflection geometry. By analyzing the THz waveform in either the time domain material homogeneity or thickness variations or the frequency domain frequency-dependent absorption as well as by other methods, images identifying material properties can be constructed J. Polar liquids and gases are highly absorptive in the THz regime; therefore, these type of samples are readily suitable for THz imaging. Recent examples of published THz imaging applications include: The number of commercially available terahertz imaging systems is extremely few even though many applications are emerging for THz imaging. New techniques have been developed for the generation and detection of THz radiation based on frequency conversion using nonlinear optics. THz techniques combine pulsed ultrafast laser technology with optoelectronics to generate terahertz radiation with sub-picosecond pulse duration. A typical set-up includes a modelocked solid-state laser that produces pulses with femtosecond pulsewidths. The Coherent Vitara laser can be used as the femtosecond optical excitation source; alternatively, the Mira Optima F system may be used. The Vitara offers the advantage of using a hands-off, turnkey solution in a single, compact, rugged package that includes the Verdi diode-pumped solid-state pump laser operating at nm and the modelocked Ti: Related Products Interferometry Low noise lasers enable interferometry with unprecedented precision. Low noise laser systems allow the detection of very small length changes with a precision that was unattainable until just recently. High precision interferometry now enables the study of previously unobserved phenomena such as gravitational waves. The direct detection of gravitational waves stands at the beginning of a whole new field of astronomy, because such waves are emitted by very massive accelerated objects such as black holes, which are often not visible with conventional telescopes. For this purpose, large scale Michelson interferometers housed within vacuum systems with an arm length of several kilometers are being built at several sites around the world. A passing gravitational wave will cause a very small arm length change in such an interferometer. Great care has to be taken to suppress all other potential noise sources below the strength of the signal that is to be detected. Such unwanted noise sources are seismic noise, thermal noise, electronic noise , as well as noise associated with the laser. Multiple stage monolithic suspensions of the interferometer optics and advanced interferometer designs with arm cavities and additional power and signal recycling mirrors are being used to address these noise sources. The laser of choice in these high precision interferometers is usually the Mephisto laser due to its very low frequency noise. In related experiments, fundamental quantum optic effects and the generation and application of squeezed light are studied. The observation of these effects is only possible when an ultra stable low noise laser system is available. When a higher output power is needed, the Mephisto MOPA is available with the same frequency stability. Interferometry applications at different wavelength such as nm or nm are also possible. Instead of detecting changes in the arm length of an interferometer, some standard institutes and research facilities require the measurement of an absolute length with very high precision. To achieve this, an absolute frequency standard, as well as extremely low frequency noise are required. The iodine stabilized Prometheus laser fulfills these requirements. Fluorescence Spectroscopy This type of spectroscopy analyzes fluorescence as a function of wavelength when the laser is tuned to an electronic absorption of the sample. This type of spectroscopy analyzes fluorescence as a function of wavelength when the laser is tuned to an electronic absorption of the sample. In general, luminescence involves the emission of electromagnetic radiation by a material after that material has absorbed energy from a light source. Luminescence is described as fluorescence when the time lag between excitation and emission is on the order of 10 nanoseconds. Laser-induced fluorescence LIF can be used for a wide array of applications, including the qualitative and quantitative measurements of the concentrations of molecules in a sample and the mapping of energy level diagrams. Fluorescence studies are usually conducted with tunable continuous wave cw laser systems; the use of frequency-doubled Ti: S lasers enhance the experimental capabilities of cw fluorescence measurements. For broadband fluorescence studies of samples in the solid or liquid states, linewidths between 2 and GHz are usually suitable. For fluorescence spectroscopic experiments in the gas phase, the most important laser parameter may be the linewidth. S gain media Ti: Systems such as the MBR ring lasers operate reliably over extended periods of time with linewidths as low as 75 kHz. One of the most important contributions to fluorescence spectroscopy has been the availability of ultrafast lasers capable of picosecond and femtosecond pulses in time-resolved fluorescence measurements. Lasers such as the Mira Optima have allowed direct excitation of materials within the lifetime of an excited state. Atomic and Molecular Spectroscopy Narrow linewidth lasers with broad tuning range enable advances in high resolution spectroscopy. Laser-based atomic spectroscopy is the measurement of absorption, emission, or scattering of electromagnetic radiation by atoms and molecules or atomic and molecular ions to study these species and their related physical processes. There are three types of events that are often studied with lasers: Absorption happens when photons are absorbed by the atom and its electrons are promoted to higher energy levels. Absorption can be studied measuring the amount of laser light transmitted by the sample as a function of the wavelength. Fluorescence happens when the excited electron decays back to its original state by emitting a photon of light at a longer wavelength smaller energy than the exciting photon from the laser. Scattering may be elastic like Rayleigh and Mie scattering or inelastic. In this section we consider mostly absorption and fluorescence spectroscopy and steady-state phenomena with high spectral resolution, rather than time-resolved studies, where pico- or femtosecond pulses are used. There are many high-resolution spectroscopic techniques. For example, the laser wavelength can be tuned to an electronic absorption of the sample and the resulting fluorescence can be analyzed as a function of wavelength. If the excitation wavelength is scanned, an absorption spectrum can be analyzed. Many distinctions of this spectroscopy exist. Lasers play an important role in high-resolution spectroscopy because of their simultaneous high-power output beam and narrow linewidth. Atomic spectroscopy both absorption and fluorescence usually requires wavelengths between nm and 2 micron. Tunable Titanium Sapphire lasers are ideally suited for atomic spectroscopy because they provide powers and tuning ranges unavailable with any other source. The natural tuning range of , nm can be extended using second harmonic generation to cover the region nm. The flagship model MBR provides a very narrow 75 kHz linewidth, suitable for high-resolution studies. The laser output of the MBR lasers can be stabilized and scanned to provide accurate spectra of atomic species. The MBD resonant ring frequency-doubler efficiently converts the MBR output to its second harmonic and further extends the available wavelength range. The specifically designed doubler MBD can be used to convert the green output of Verdi to its second harmonic in the deep UV. Related Products Atom Trapping and Cooling The development of methods to cool and trap atoms using laser light. The control of atomic motion by laser light is an application that has exploded over the last few years. The possibility of reaching extremely low atomic kinetic-energy temperatures near absolute zero is perhaps the most astonishing achievement. Research in atom trapping and cooling has led to insights into the interaction of matter and radiation and a variety of applications in areas such as spectroscopy, atomic clocks, atomic interferometers, optics, lithography, and gravitational measurements. Laser beams are used to chill atoms and trap them in space. At first it would seem that cooling atoms using a laser source would be unlikely, but the technique has readily been demonstrated by the Nobel prize-winning work of Steven Chu, William D. Phillips and Claude Cohen-Tannoudji. When an atom is illuminated by counter-propagating light and absorbs a photon, its momentum changes the atomic velocity. After many cycles of absorption and emission, the velocity of the atom becomes nearly zero. In each cycle the atom loses energy which corresponds to the Doppler shift. The kinetic energy of the atom can eventually be lower than one microKelvin. As the atom moves in the direction of one of the laser beams it sees a frequency increase Doppler effect. The atom is then fixed in space by the two beams. Cooling allows the atom to be held longer since its random thermal motions are minimized. Laser cooling applications demand single-frequency operation in the visible red and IR wavelength region. Pulsed Laser Deposition Short and intense laser pulses provide unique benefits for many pulsed laser deposition applications. Pulsed laser deposition PLD is a laser-based technique used to grow high quality thin films of complex materials on substrates like Silicon wafers. The material to be deposited target is vaporized by short and intense laser pulses and forms a plasma plume. Then, the vaporized target material from the plasma bombards the substrate and â€” under the right conditions â€” creates a thin homogenous layer on this substrate. For each laser shot, a layer of only a few nanometers of material is ablated to form the plasma plume in a process that typically last a few tens of picoseconds. To enable this process, nanosecond pulses with energies of tens or hundreds of millijoules are necessary and UV wavelengths are usually preferred. These requirements match well the performances of excimer lasers. The first laser deposition experiments took place in the mid to late s, but PLD gained tremendous interest after T. Venketesan in first applied this method to create high temperature superconductive HTSC films. Among UV pulsed lasers, excimer lasers provide a variety of short wavelengths combined with energy levels that fit perfectly most PLD applications.

SCIENTIFIC APPLICATIONS OF THE CONNECTION MACHINE pdf

2: Conference on Scientific Applications of the Connection Machine - CORE

Note: Citations are based on reference standards. However, formatting rules can vary widely between applications and fields of interest or study. The specific requirements or preferences of your reviewing publisher, classroom teacher, institution or organization should be applied.

Block-cyclic order elimination algorithms for LU and QR factorization and solve routines are described for distributed memory architectures with processing nodes configured as two-dimensional arrays of arbitrary shape. The cyclic order elimination together with a consecutive data allocation yields g The cyclic order elimination together with a consecutive data allocation yields good load--balance for both the factorization and solution phases for the solution of dense systems of equations by LU and QR decomposition. Blocking may offer a substantial performance enhancement on architectures for which the level-2 or level-3 BLAS are ideal for operations local to a node. High rank updates local to a node may have a performance that is a factor of four or more higher than a rank-1 update. We present one matrix multiplication algorithm for two--dimensional arrays of processing nodes, and one algorithm for three--dimensional nodal arrays. One--dimensional nodal arrays are treated as a degenerate case. The algorithms are designed to utilize fully the communications bandwidth in high deg The algorithms are designed to utilize fully the communications bandwidth in high degree networks in which the one--, two--, or three--dimensional arrays may be embedded. For binary n-cubes, our algorithms offer a speedup of the communication over previous algorithms for square matrices and square two--dimensional arrays by a factor of n 2. The three--dimensional algorithm requires temporary storage proportional to the length of the nodal array axis aligned with the axis shared between the multiplier and the multiplicand. The optimal two--dimensional nodal array shape with respect to communicati Show Context Citation Context Lennart Johnsson - Parallel Computing , " No assumption is made on the shape or size of the operands. For matrix--matrix multiplication, both the nonsystolic and the systolic algo For matrix--matrix multiplication, both the nonsystolic and the systolic algorithms are outlined. A systolic algorithm that computes the product matrix in--place is described in detail. For certain matrix shapes the systolic algorithms offer both improved performance and significantly reduced temporary storage requirements compared to the nonsystolic block algorithms. We show that, in order to minimize the communication time, an algorithm that leaves the largest operand matrix stationary should be chosen for matrix--matrix multiplication. Furthermore, it is sh The reduction operation required in computing C can be expressed similarly. The level DBLAS matrix--matrix multiplication routine based on extraction of b columns of B, transposition and alignmen

SCIENTIFIC APPLICATIONS OF THE CONNECTION MACHINE pdf

3: Engineering - Wikipedia

Scientific Applications of the Connection Machine,books, textbooks, text book Compare book prices at online bookstores worldwide for the lowest price for new & used textbooks and discount books! 1 click to get great deals on cheap books, cheap textbooks & discount college textbooks on sale.

The Warp machine is a systolic array computer of linearly connected cells, each of which is a programmable processor capable of performing 10 million floating-point operations per second 10 MFLOPS. The Warp array can be extended to include more cells to accommodate applications capable of using the increased computational bandwidth. Warp is integrated as an attached processor into a UN host system. Programs for Warp are written in a high-level language supported by an optimizing compiler. Show Context Citation Context We chose these architectures because they have also been used extensively for computer vision and image processing, and because the design choices in these architectures were made signif Atkeson, Stefan Schaal - Neurocomputing , " This paper explores a memory-based approach to robot learning, using memorybased neural networks to learn models of the task to be performed. Steinbuch and Taylor presented neural network designs to explicitly store training data and do nearest neighbor lookup in the early s. In this paper their In this paper their nearest neighbor network is augmented with a local model network, which fits a local model to a set of nearest neighbors. This network design is equivalent to a statistical approach known as locally weighted regression, in which a local model is formed to answer each query, using a weighted regression in which nearby points similar experiences are weighted more than distant points less relevant experiences. We illustrate this approach by describing how it has been used to enable a robot to learn a difficult juggling task. Nearest neighbor approaches have also been used in nonparametric regression and fitting surfaces to data. Often, a group of similar experiences, or nearest neighbors The complexity of most machine learning techniques can be improved by transforming iterative components into their parallel equivalent. Although this parallelization has been considered in theory, few implementations have been performed on existing parallel machines. The parallel architecture of the The parallel architecture of the Connection Machine provides a platform for the implementation and evaluation of parallel learning techniques. The architecture of the Connection Machine is described along with limitations of the language interface that constrain the implementation of learning programs. Connection Machine implementations of two learning programs, Perceptron and AQ, are described, and their computational complexity is compared to that of the corresponding sequential versions using actual runs on the Connection Machine. Techniques for parallelizing ID3 are also analyzed, and the advantages and disadvantages of parallel implementation on the Connection Machine are discussed in the context of machine learning. Virtually no work has been done to parallelize inductive learning techn

4: CiteSeerX â€” Citation Query All-to-all broadcast with applications on the Connection Machine

The creative application of scientific principles to design or develop structures, machines, apparatus, or manufacturing processes, or works utilizing them singly or in combination; or to construct or operate the same with full cognizance of their design; or to forecast their behavior under specific operating conditions; all as respects an intended function, economics of operation and safety to life and property. History of engineering Relief map of the Citadel of Lille , designed in by Vauban , the foremost military engineer of his age. Engineering has existed since ancient times, when humans devised inventions such as the wedge, lever, wheel and pulley. Notable examples of the obsolete usage which have survived to the present day are military engineering corps, e. Army Corps of Engineers. The word "engine" itself is of even older origin, ultimately deriving from the Latin ingenium c. Ancient era[edit] The Ancient Romans built aqueducts to bring a steady supply of clean and fresh water to cities and towns in the empire. Other monuments, no longer standing, such as the Hanging Gardens of Babylon , and the Pharos of Alexandria were important engineering achievements of their time and were considered among the Seven Wonders of the Ancient World. The earliest civil engineer known by name is Imhotep. The Antikythera mechanism , the first known mechanical computer , [8] [9] and the mechanical inventions of Archimedes are examples of early mechanical engineering. In the Middle Ages, the trebuchet was developed. Renaissance era[edit] A water-powered mine hoist used for raising ore, ca. Aside from these professions, universities were not believed to have had much practical significance to technology. De re metallica was the standard chemistry reference for the next years. Similarly, in addition to military and civil engineering, the fields then known as the mechanic arts became incorporated into engineering. Canal building was an important engineering work during the early phases of the Industrial Revolution. He was an English civil engineer responsible for the design of bridges , canals , harbours , and lighthouses. He was also a capable mechanical engineer and an eminent physicist. Using a model water wheel, Smeaton conducted experiments for seven years, determining ways to increase efficiency. He is important in the history, rediscovery of, and development of modern cement , because he identified the compositional requirements needed to obtain "hydraulicity" in lime; work which led ultimately to the invention of Portland cement. Applied science lead to the development of the steam engine. The sequence of events began with the invention the barometer and the measurement of atmospheric pressure by Evangelista Torricelli in , demonstration of the force of atmospheric pressure by Otto von Guericke using the Magdeburg hemispheres in , laboratory experiments by Denis Papin , who built experimental model steam engines and demonstrated the use of a piston, which he published in Edward Somerset, 2nd Marquess of Worcester published a book of inventions containing a method for raising waters similar to a coffee percolator. Samuel Morland , a mathematician and inventor who worked on pumps, left notes at the Vauxhall Ordinance Office on a steam pump design that Thomas Savery read. The higher furnace temperatures made possible with steam powered blast allowed for the use of more lime in blast furnaces , which enabled the transition from charcoal to coke. With the development of the high pressure steam engine, the power to weight ratio of steam engines made practical steamboats and locomotives possible. This bridge was made of cast iron , which was soon displaced by less brittle wrought iron as a structural material One of the most famous engineers of the mid 19th century was Isambard Kingdom Brunel , who built railroads, dockyards and steamships. The Industrial Revolution created a demand for machinery with metal parts, which led to the development of several machine tools. Boring cast iron cylinders with precision was not possible until John Wilkinson invented his boring machine , which is considered the first machine tool. Precision machining techniques were developed in the first half of the 19th century. These included the use of gigs to guide the machining tool over the work and fixtures to hold the work in the proper position. Machine tools and machining techniques capable of producing interchangeable parts lead to large scale factory production by the late 19th century. In there were a dozen U. In , there were 6, engineers in civil, mining , mechanical and electrical. Germany established technical universities earlier. The theoretical work of James Maxwell see: The later inventions of the vacuum tube and the transistor further accelerated the development of electronics to such an extent that electrical and electronics engineers currently outnumber their colleagues of any other engineering specialty. Its origins can be traced back to the aviation pioneers around the start of the 20th century although the work of Sir George Cayley has recently been dated as being from the last decade of the 18th century. Early knowledge of aeronautical engineering was largely empirical with some concepts and skills imported from other branches of engineering. Meanwhile, research to provide fundamental background science continued by combining theoretical physics with experiments. Main branches of engineering[edit] For a topical guide to this subject, see Outline of engineering. Hoover Dam Engineering is a broad discipline which is often broken down into several sub-disciplines. Although an engineer will usually be trained in a specific discipline, he or she may become multi-disciplined through experience. Engineering is often characterized as having four main branches: Chemical engineering Chemical engineering is the application of physics, chemistry, biology, and engineering principles in order to carry out chemical processes on a commercial scale, such as the manufacture of commodity chemicals , specialty chemicals , petroleum refining , microfabrication , fermentation , and biomolecule production. Civil engineering Civil engineering is the design and construction of public and private works, such as infrastructure airports , roads , railways , water supply, and treatment etc. It is traditionally considered to be separate from military engineering.

5: Connection Machine and DataVault from Thinking Machines Corporation

E-raamat: Scientific Applications Of The Connection Machine (2nd Edition) - Horst D. Simon. The connection machine is a commercially available machine which allows users to explore parallelism to solve large-scale scientific and engineering problems.

6: CiteSeerX â€” Citation Query Applications of the Connection Machine

Scientific applications of the connection machine (2nd, e raamat: scientific applications of the connection machine (2nd edition) horst d simon the connection machine is a commercially available machine which allows users to explore.

7: Danny Hillis - Wikipedia

*Proceedings of the Conference on Scientific Applications of the Connection Machine: Nasa Ames Research Center, Moffett Field, California September 1 [Horst D. Simon] on www.enganchecubano.com *FREE* shipping on qualifying offers.*

SCIENTIFIC APPLICATIONS OF THE CONNECTION MACHINE pdf

USA Photography Guide 3 Overcoming personal karma Further mathematics for economic analysis knut sydsaeter The Capitalist Cycle Case studies in counseling and psychotherapy. Center of the universe Birthday Surprise Vol. 10 Dreams, schemes, and mysteries Library technicians in Australia Honda generator parts manual The Mexican whorled milkweed (Asclepias mexicana as a poisonous plant. Bibliography Of James Harvey Robinson Ecology and strategy Depression and other nasties Psychiatric aspects of morale, by H. S. Sullivan. Elements of Survey Sampling (Texts in the Mathematical Sciences) German parachute forces 1935-45 Robots aliens asimov thurston Look whos cooking V. 2. Studies of nine audio-recorded psychoanalytic sessions Merton M. Gill and Irwin Z. Hoffman. The rejection of intentionality Miracle on Twelfth Street (Rosa Parks Boulevard) Developing utilities in assembly language Northeast from Boston A historical grammar of the French tongue The milk turns sour Cigar Aficionados: Buying Guide Teens and drunk driving Drama in Africa (African Literature Today, No 8) Chopsticks only work in pairs Sweet Valley High #06 Cripple Creek District Health visiting and the elderly Web Photoshop Expert SAFE SCHOOL AMBASSADORS Acquiring true beliefs and acquiring knowledge through being told The compleat cast of characters in literature. The rise and fall of Louis Sockalexis Contemporary Germany. The American commonwealth