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OCTOBER 2004

20040093627

Some approaches to medical support for Martian expedition

Kozlovskaya, Inessa B., Author; Egorov, Anatoly D., Author; Acta astronautica; Aug-Nov 2003; ISSN 0094-5765; Volume 53, Issue 4-10, 269-75; In English; Copyright; Avail: Other Sources

Medical support in a Martian expedition will be within the scope of crew responsibilities and maximally autonomous. Requirements to the system of diagnostics in this mission include considerable use of means and methods of visualization of the main physiological parameters, telemedicine, broad usage of biochemical analyses (including 'dry' chemistry), computerized collection, measurement, analysis and storage of medical information. The countermeasure system will be based on objective methods of crew fitness and working ability evaluation, individual selection of training regimens, and intensive use of computer controlled training. Implementation of the above principles implies modernization and refinement of the countermeasures currently used by space crews of long-term missions (LTM), and increases of the assortment of active and passive training devices, among them a short-arm centrifuge. The system of medical care with the functions of prevention, clinical diagnostics and timely treatment will be autonomous, too. The general requirements to medical care during the future mission are the following: availability of conditions and means for autonomous urgent and special medical aid and treatment of the most possible states and diseases, 'a hospital', and assignment to the crew of one or two doctors. To ensure independence of medical support and medical care in an expedition to Mars an automated expert system needs to be designed and constructed to control the medical situation as a whole. c2003 Published by Elsevier Science Ltd.

NLM

Aerospace Medicine; Expeditions; Mars (Planet); Medical Services; Public Health; Weightlessness

20030112454 NASA Ames Research Center, Moffett Field, CA, USA

Method and Apparatus for Virtual Interactive Medical Imaging by Multiple Remotely-Located Users

Ross, Muriel D., Inventor; Twombly, Ian Alexander, Inventor; Senger, Steven O., Inventor; August 19, 2003; In English; Avail: CASI; A03, Hardcopy

A virtual interactive imaging system allows the displaying of high-resolution, three-dimensional images of medical data to a user and allows the user to manipulate the images, including rotation of images in any of various axes. The system includes a mesh component that generates a mesh to represent a surface of an anatomical object, based on a set of data of the object, such as from a CT or MRI scan or the like. The mesh is generated so as to avoid tears, or holes, in the mesh, providing very high-quality representations of topographical features of the object, particularly at high- resolution. The system further includes a virtual surgical cutting tool that enables the user to simulate the removal of a piece or layer of a displayed object, such as a piece of skin or bone, view the interior of the object, manipulate the removed piece, and reattach the removed piece if desired. The system further includes a virtual collaborative clinic component, which allows the users of multiple, remotely-located computer systems to collaboratively and simultaneously view and manipulate the high-resolution, three-dimensional images of the object in real-time.

Author

Imaging Techniques; Rotation; High Resolution

20040096113

Medical care from space: Telemedicine

Feliciani, Francesco, Author; ESA bulletin. Bulletin ASE. European Space Agency; May 2003; ISSN 0376-4265; Volume 114, 54-9; In English; Copyright; Avail: Other Sources

'Telemedicine' can be defined in various ways, but the underlying concept is based on the simple fact that, thanks to modern telecommunications links, diagnostic and therapeutic medical information can be passed between patient and doctor

without either of them having to travel. Initially and for quite a long period, voice communication, via telephone or radio, was used to solicit the opinion of a doctor in the case of an emergency, but the potential of Telemedicine was boosted dramatically by the widespread introduction of modern information and communication technology (ICT) into the healthcare sector. Today we are at the point where the boundary separating Telemedicine and medical ICT is somewhat blurred. The prospect of using satellite communications technologies and associated connectivity services to support even wider application of the benefits of Telemedicine was the reason why ESA began actively pursuing activities in this challenging domain back in 1996.
NLM
Medical Services; Public Health; Satellite Communication; Telemedicine

20040100901
Evolution of telemedicine in Russia: the influence of the space program on modern telemedicine programs
Doarn, Charles R., Author; Lavrentyev, Vladimir A., Author; Orlov, Oleg I., Author; Nicogossian, Arnauld E., Author; Grigoriev, Anatoly I., Author; Ferguson, Earl W., Author; Merrell, Ronald C., Author; Telemedicine journal and e-health : the official journal of the American Telemedicine Association; Spring 2003; ISSN 1530-5627; Volume 9, Issue 1, 103-9; In English; Copyright; Avail: Other Sources

Telemedicine education and application throughout Russia has its roots in Russia's space program. The concepts of telemedicine have evolved during the course of 40 years of space exploration. This paper reviews the evolution of telemedicine and the achievements of the Soviet/Russian Space Program.
NLM
Space Programs; Telemedicine

20030064063 Texas Univ. Health Science Center, Houston, TX, USA
User and Task Analysis of the Flight Surgeon Console at the Mission Control Center of the NASA Johnson Space Center
Johnson, Kathy A.; Shek, Molly; National Aeronautics and Space Administration (NASA)/American Society of Engineering Education (ASEE) Summer Faculty Fellowship Program - 2000; March 2003, 6-1 - 6-12; In English
Contract(s)/Grant(s): NAG9-867; No Copyright; Avail: CASI; A03, Hardcopy

Astronauts in a space station are to some extent like patients in an intensive care unit (ICU). Medical support of a mission crew will require acquisition, transmission, distribution, integration, and archiving of significant amounts of data. These data are acquired by disparate systems and will require timely, reliable, and secure distribution to different communities for the execution of various tasks of space missions. The goal of the Comprehensive Medical Information System (CMIS) Project at Johnson Space Center Flight Medical Clinic is to integrate data from all Medical Operations sources, including the reference information sources and the electronic medical records of astronauts. A first step toward the full CMIS implementation is to integrate and organize the reference information sources and the electronic medical record with the Flight Surgeons console. In order to investigate this integration, we need to understand the usability problems of the Flight Surgeon's console in particular and medical information systems in general. One way to achieve this understanding is through the use of user and task analyses whose general purpose is to ensure that only the necessary and sufficient task features that match users capacities will be included in system implementations. The goal of this summer project was to conduct user and task analyses employing cognitive engineering techniques to analyze the task of the Flight Surgeons and Biomedical Engineers (BMEs) while they worked on Console. The techniques employed were user interviews, observations and a questionnaire to collect data for which a hierarchical task analysis and an information resource assessment were performed. They are described in more detail below. Finally, based on our analyses, we make recommendations for improvements to the support structure.
Author
Flight Surgeons; Information Systems; Space Stations; Consoles

20040087819
Ultrasound in space
Martin, David S., Author; South, Donna A., Author; Garcia, Kathleen M., Author; Arbeille, Philippe, Author; Ultrasound in medicine & biology; Jan 2003; ISSN 0301-5629; Volume 29, Issue 1, 1-12; In English; Copyright; Avail: Other Sources

Physiology of the human body in space has been a major concern for space-faring nations since the beginning of the space era. Ultrasound (US) is one of the most cost effective and versatile forms of medical imaging. As such, its use in characterizing microgravity-induced changes in physiology is being realized. In addition to the use of US in related ground-based studies, equipment has also been modified to fly in space. This involves alteration to handle the stresses of launch and different power

and cooling requirements. Study protocols also have been altered to accommodate the microgravity environment. Ultrasound studies to date have shown a pattern of adaptation to microgravity that includes changes in cardiac chamber sizes and vertebral spacing. Ultrasound has been and will continue to be an important component in the investigation of physiological and, possibly, pathologic changes occurring in space or as a result of spaceflight.
NLM
Aerospace Medicine; Sonograms; Ultrasonics

20040099008
The TERESA project: from space research to ground tele-echography
Vieyres, Pierre, Author; Poisson, Gerard, Author; Courreges, Fabien, Author; Merigeaux, Olivier, Author; Arbeille, Philippe, Author; The Industrial robot; 2003; ISSN 0143-991X; Volume 30, Issue 1, 77-82; In English; Copyright; Avail: Other Sources

Ultrasound examinations represent one of the major diagnostic modalities of future healthcare. They are currently used to support medical space research but require a high skilled operator for both probe positioning on the patient's skin and image interpretation. TERESA is a tele-echography project that proposes a solution to bring astronauts and remotely located patients on ground quality ultrasound examinations despite the lack of a specialist at the location of the wanted medical act.
NLM
Aerospace Medicine; Robotics; Sonograms; Telemedicine

20030003661 NASA Glenn Research Center, Cleveland, OH USA
Non-Invasive Health Diagnostics using Eye as a 'Window to the Body'
Ansari, Rafat R.; Sixth Microgravity Fluid Physics and Transport Phenomena Conference; November 2002; Volume 1, 800-830; In English; No Copyright; Avail: CASI; A03, Hardcopy

As a 'window to the body', the eye offers the opportunity to use light in various forms to detect ocular and systemic abnormalities long before clinical symptoms appear and help develop preventative/therapeutic countermeasures early. The effects of space travel on human body are similar to those of normal aging. For example, radiation exposure in space could lead to formation of cataracts and cancer by damaging the DNA and causing gene mutation. Additionally, the zero-gravity environment causes fluid shifts in the upper extremities of the body and changes the way blood flows and organ system performs. Here on Earth, cataract, age-related macular degeneration (AMD), diabetic retinopathy (DR), and glaucoma are major eye diseases and are expected to double in next two decades. To detect, prevent, and treat untoward effects of prolonged space travel in real-time requires the development of non-invasive diagnostic technologies that are compact and powerful. We are developing fiber-optic sensors to evaluate the ocular tissues in health, aging, and disease employing the techniques of dynamic light scattering (cataract, uveitis, Alzheimer's, glaucoma, DR, radiation damage, refractive surgery outcomes), auto-fluorescence (aging, DR), laser-Doppler flowmetry (choroidal blood flow), Raman spectroscopy (AMD), polarimetry (diabetes), and retinal oximetry (occult blood loss). The non-invasive feature of these technologies integrated in a head-mounted/goggles-like device permits frequent repetition of tests, enabling evaluation of the results to therapy that may ultimately be useful in various telemedicine applications on Earth and in space.
Author
Aerospace Medicine; Eye Diseases; Radiation Dosage; Biological Effects; Deoxyribonucleic Acid; Cells (Biology); Bioinstrumentation; Space Flight

20040107294
Performance of advanced trauma life support procedures in microgravity
Campbell, Mark R., Author; Billica, Roger D., Author; Johnston, Smith L 3rd, Author; Muller, Matthew S., Author; Aviation, space, and environmental medicine; Sep 2002; ISSN 0095-6562; Volume 73, Issue 9, 907-12; In English; Copyright; Avail: Other Sources

BACKGROUND: Medical operations on the International Space Station will emphasize the stabilization and transport of critically injured personnel and so will need to be capable of advanced trauma life support (ATLS). METHODS: We evaluated the ATLS invasive procedures in the microgravity environment of parabolic flight using a porcine animal model. Included in the procedures evaluated were artificial ventilation, intravenous infusion, laceration closure, tracheostomy, Foley catheter drainage, chest tube insertion, peritoneal lavage, and the use of telemedicine methods for procedural direction. RESULTS: Artificial ventilation was performed and appeared to be unaltered from the 1-G environment. Intravenous infusion, laceration closure, percutaneous dilational tracheostomy, and Foley catheter drainage were achieved without difficulty. Chest tube insertion and drainage were performed with no more difficulty than in the 1-G environment due to the ability to restrain patient,

operator and supplies. A Heimlich valve and Sorenson drainage system were both used to provide for chest tube drainage collection with minimal equipment, without the risk of atmospheric contamination, and with the capability to auto-transfuse blood drained from a hemothorax. The use of telemedicine in chest tube insertion was demonstrated to be useful and feasible. Peritoneal lavage using a percutaneous technique, although requiring less training to perform, was found to be dangerous in weightlessness due to the additional pressure of the bowel on the anterior abdominal wall creating a high risk of bowel perforation. CONCLUSIONS: The performance of ATLS procedures in microgravity appears to be feasible with the exception of diagnostic peritoneal lavage. Minor modifications to equipment and techniques are required in microgravity to effect surgical drainage in the presence of altered fluid dynamics, to prevent atmospheric contamination, and to provide for the restraint requirements. A parabolic simulation system was developed for equipment and procedure verification, physiological research, and possible crew medical officer training in the future.
NLM
Aerospace Medicine; Gravitational Physiology; Injuries; Life Support Systems; Microgravity; Weightlessness Simulation

20040102918
Space technologies in routine telemedicine practice: commercial approach
Orlov, O., Author; Grigoriev, A., Author; Acta astronautica; Jul-Nov 2002; ISSN 0094-5765; Volume 51, Issue 1-9, 295-300; In English; Copyright; Avail: Other Sources
No abstract available
Aerospace Engineering; Aerospace Medicine; Commerce; Economics; Telemedicine; Weightlessness

20040108869
Telemedicine and spaceflight
Grigoriev, Anatoly I., Author; Orlov, Oleg I., Author; Aviation, space, and environmental medicine; Jul 2002; ISSN 0095-6562; Volume 73, Issue 7, 688-93; In English; Copyright; Avail: Other Sources
Medical assessment and treatment of crews during spaceflight is primarily perfomed by the Earth-based medical staff analyzing information received by telemetry and onboard preventive and medical treatment facilities. In the coming decades, the building of the International Space Station (ISS) will be the most important near-Earth space exploration project. Remote monitoring and distance support of the crewmembers by the Earth-based clinical medicine specialists will become increasely important. The international nature of the ISS will require integrating medical support systems of the participating countries. Consideration must also be given to biomedical ethics and the confidentiality of the medical information exchanged. In Russia, the construction of the telemedicine network for the Russian node of the ISS has been completed. It is evident that during interplanetary flight biomedical problems will be much more difficult than during orbital flights of the same duration. Such a long-duration flight will require development of a special telemedical support system, as well as onboard facilities, which will present many new challenges. This new system will involve the integration of information technologies with biology, as well as physics and chemistry, representing a new interdisciplinary technological breakthrough.
NLM
Aerospace Medicine; Space Flight; Telemedicine

20040108923
Telemedicine and remote patient monitoring
Field, Marilyn J., Author; Grigsby, Jim, Author; JAMA : the journal of the American Medical Association; Jul 24-31 2002; ISSN 0098-7484; Volume 288, Issue 4, 423-5; In English; Copyright; Avail: Other Sources
No abstract available
Patients; Telemedicine

20040098270
[Application of high definition television images in telemedicine]
Miyamoto, Akira, Author; Sekiguchi, Chiharu, Author; Uchu koku kankyo igaku / Nihon Uchu Koku Kankyo Igakkai; Jun 2002; ISSN 0387-0723; Volume 39, Issue 2, 73-4; In Japanese; Copyright; Avail: Other Sources
No abstract available
High Definition Television; Space Environment Simulation; Telemedicine; Television Systems

20040103125

[Application of the strategic management approaches to implementation of space technologies in health services by the example of telemedicine]

Orlov, O. I., Author; Aviakosmicheskaia i ekologicheskaia meditsina = Aerospace and environmental medicine; 2002; ISSN 0233-528X; Volume 36, Issue 5, 57-9; In Belorussian; Copyright; Avail: Other Sources

Telemedicine serves as an argument for application of the strategic management technologies. A telemedicine implementation strategy has been developed to be introduced in the Russian health services.

NLM

Aerospace Engineering; Aerospace Medicine; Medical Services; Telemedicine

20040117063

Wireless telemetry and Internet technologies for medical management: a Martian analogy

Harnett, B. M., Author; Doarn, C. R., Author; Russell, K. M., Author; Kapoor, V., Author; Merriam, N. R., Author; Merrell, R. C., Author; Aviation, space, and environmental medicine; Dec 2001; ISSN 0095-6562; Volume 72, Issue 12, 1125-31; In English; Copyright; Avail: Other Sources

BACKGROUND: The NASA Haughton-Mars Project Base Camp on Devon Island, Canada (approximately 75 degrees north) was the site for transmission of vital signs from two 'terranauts' (individuals who acted as Earthbound astronauts) back to the USA in (artificially delayed) real-time. METHODS: The subjects became 'physiologic ciphers' for status monitoring using readily available technologies that affordably captured and distributed vital signs to a variety of platforms. This study of nominal monitoring and simulated medical emergency used wireless technologies and the Internet. RESULTS: Basic vital signs and images can be sent using wireless topologies and completely automated functions. Due to the lightweight transport requirements, existing low data rate connections can easily handle the volume of traffic. CONCLUSIONS: Monitoring, the health of space travelers will be an important component for both low-Earth orbiting spacecraft and long-term missions to distant planets. However, terrestrial applications represent the primary application of such technologies because the home can be a remote and hazardous environment as well.

NLM

Aerospace Medicine; Analogies; Internets; Mars (Planet); Telemedicine; Telemetry

20020050572 Landstuhl Regional Medical Center, Landstuhl, Germany

LRMC Remote Nerve Fiber Laser Analysis and Telephthalmology Project

Hess, Todd D.; Nov. 2001; In English

Contract(s)/Grant(s): MIPR-1DCB8D1065

Report No.(s): AD-A401215; No Copyright; Avail: CASI; A02, Hardcopy

Submitted modified protocol to the Walter Reed Army Medical Center Institutional Review Board (local IRB) where the Human Use committee approved the protocol for human use exemption. Since we chose to use pre-existing data, full human use approval was not needed. Three glaucoma specialists from Military Treatment Facilities in CONUS were briefed on the protocol and volunteered to participate in the study as our 'consultants'. The main part of the study was completed with the email and postal mailing of Gdx imagers and questionnaires to the three glaucoma specialists.

Derived from text

Fiber Lasers; Glaucoma; Clinical Medicine; Telemedicine

20020050574 Landstuhl Regional Medical Center, Landstuhl, Germany

ERMC Remote Teleoptometry Project

Kobylarz, Erik J.; Nov. 2001; In English

Contract(s)/Grant(s): MIPR-1DCB8E1066

Report No.(s): AD-A401218; No Copyright; Avail: CASI; A02, Hardcopy

TRICARE Europe Systems Information and Analysis Office developed the Tele-Ocular Health Application software using the DoD Medical Advanced Technology Management Office (MATMO) Teledermatology application as a model. I designed the site layout. The first prototype of the Tele-Ocular Health system, known as Teleophthalmology, was completed in September 2001. The prototype allowed secure login and the submission fo a telemedicine consult. The Landstuhl Regional Medical Center (LRMC) opthalmology and optometry staffs reviewed Version 1.0 on September 27, 2001, modified the Consult form, and renamed the application 'Tele-Ocular Health'.

Derived from text

Applications Programs (Computers); Biotechnology; Medical Equipment; Ophthalmology; Optometry; Prototypes; Telemedicine

20020050579 Walter Reed Army Medical Center, Washington, DC USA

Augmentation of Acute Stroke Management via Telemedicine

Choi, John Y.; Nov. 2001; In English

Contract(s)/Grant(s): MIPR-1DCB851059

Report No.(s): AD-A401210; No Copyright; Avail: CASI; A02, Hardcopy

What have you accomplished relative to the goals as stated in your proposal: (1) Study nurse coordinator started employment at the end of May 2001 to arrange for administrative completion of study associated data collection methods, coordination of installation of study related technical equipment, selecting and ordering equipment, coordination of communication among participating associated investigators, and for patient recruitment; (2) All necessary forms submitted to the IRB. The IRB approval was obtained in August of 2000 with renewal of the protocol in July of 2001; (3) Necessary telemedicine study equipment was installed at the study sites. (PictureTel monitors and associated VTC equipment, flat-screen monitors, one PC, and VCR with digital video tape/VHS capabilities were installed). Investigators received informal and formal training to familiarize themselves with the study equipment; (4) Arranged for installation of lines for transmission of study VTC data, (BRI lines by Verizon for phase 1 of the study within Walter Reed Army Medical Center from the physician office to the emergency department) Plans are in place for installation of an ISDN for VTC support in the remote site of Dewitt Army Community Hospital, Ft. Belvoir, VA; (5) Installation and functioning personal computer platform for teleradiology with active radiology imaging received from Dewitt Army Community Hospital in the physician home setting using cable modem access and equipment installation by MidAtlantic, Inc. Initiation of similar teleradiology system in the physician office at Walter Reed Army Medical Center has been made; and (6) Orientation of associated investigators to relevant skills necessary for the study intervention.

DTIC

Installing; Telemedicine; Telecommunication; Medical Services

20020050583 Brooke Army Medical Center, Fort Sam Houston, TX USA

Remote Echocardiography: Proof of Concept for Support of National Disasters, Combat and Humanitarian Mission

Boyd, Sheri Y. N.; Nov. 2001; In English

Contract(s)/Grant(s): MIPR-1DCB8F1067

Report No.(s): AD-A401182; No Copyright; Avail: CASI; A02, Hardcopy

As the timeline above outlines, the project has been very active and included initial testing to develop a working wireless vest to allow portable handheld echo units to be moved and used in a MASCAL (Mass Casualty) or CSH (Combat Support Hospital) setting. Once developed this unit was tested locally for its ability to interface with portable satellite units. Finally an actual simulated MASCAL and CSH scenario was developed using facilities at Camp Bullis, TX. Patients with actual cardiac disease were transported to the site and imaged in the CSH with our portable echo units and wireless vest. Images were transmitted to BAMC (Brooke Army Medical Center) via VSAT (Very Small Aperture Terminal) and INMARSAT and interpreted by cardiologist in real-time and later reviewed in a blinded fashion for diagnostic accuracy. Currently we are analyzing data and preparing manuscripts for publication which will outline our experience, and results. Initial data was presented at the Army ACP (American College of Physicians) meeting and well received.

DTIC

Portable Equipment; Echocardiography; Armed Forces (United States); Telemedicine

20020050767 Walter Reed Army Medical Center, Washington, DC USA

Robotic and Virtual Slide Telepathology

Kaplan, Keith J.; Nov. 2001; In English

Contract(s)/Grant(s): MIPR-1DCB871061

Report No.(s): AD-A401200; No Copyright; Avail: CASI; A02, Hardcopy

To date, we have reviewed several frozen section (FS) pathology cases in a retrospective fashion with remote, robotic real-time telepathology (TP). The telepathologist is given the usual clinical information with regard to organ site, sex and age of the patient and any pertinent clinical/radiographic information that was available on the surgical pathology tissue examination request form at the time of the intraoperative consultation. Each case is evaluated by TP without prior knowledge of the FS or final diagnosis and could be given a diagnosis or deferred if image/technical quality is sub-optimal. All slides used in the TP evaluation are later reviewed by conventional light microscopy by the same pathologist to assess intraobserver agreement between the TP and FS diagnosis. Later, all diagnoses are compared with the original FS and final diagnosis to assess interobserver agreement Diagnostic errors were classified as interpretation errors if differences between TP and FS diagnosis are obtained, and as sampling errors, if discrepancies between the FS slides and slides prepared from formalin-fixed,

paraffin-embedded tissues are seen. Agreements between the telepathology and glass slide diagnosis were reviewed and compared with the final diagnosis in conjunction with routine monthly intradepartmental quality assurance programs (new FS diagnosis versus final diagnosis). The Trestle Corporation (Newport Beach, CA) MedMicroscopy system has been initially installed at three referring institutions throughout the AMEDD (Army Medical Department). Initial installation sites include Walter Reed Army Medical Center (Washington, DC), Ireland Army Community Hospital (Fort Knox, Kentucky), Womack Army Medical Center (Fort Bragg, North Carolina) and Landstuhl Regional Medical Center (Landstuhl, Germany). Cases are transmitted from the daily workload. The use of consecutive cases eliminated bias related to case complexity.
DTIC
Robotics; Pathology; Medical Services; Medical Electronics; Telemedicine

20030019281 Brunel Univ., Uxbridge UK
Optimum Delivery of Telemedicine Over Low Bandwidth Satellite Links
Clarke, M.; Fragos, A.; Jones, R. W.; Lioupis, D.; Oct. 25, 2001; In English; Original contains color images
Report No.(s): AD-A409916; No Copyright; Avail: CASI; A01, Hardcopy

Telemedicine is frequently used to support the delivery of medicine to remote regions, but it can often be the case that these areas are poorly served by communications, The AIDMAN project investigates the delivery of telemedicine in remote regions of Greece using satellite. However the high cost of such links can severely limit the bandwidth available to applications. In addition the satellite link is a clear channel and may be configured to emulate any protocol. This presents a problem of determining which protocol may best support the applications. We have modelled the three types of link protocol, circuit switched (ISDN), packet switched (TCP/IP) and cell switched (ATM) to determine how their characteristics affect the performance when bandwidth is severely restricted. We further investigate how performance may be optimized when the link is used to carry mixed traffic of real time video conference and image transfer, Our simulation shows that TCP/IP can support telemedicine applications reasonably well, so long as the number of simultaneous image transfers are restricted. Furthermore, IPv6, which supports prioritization of traffic, can overcome this restriction. Use of TCP/IP has further advantage, in that it permits integration of wider networks, is cheap, widely available and supports virtually all telemedicine applications. Real-time measurements using the virtual consultation workstations developed for the AIDMAN project on a low bandwidth link implemented on routers connected using ISDN to simulate a link with 128 kbps and on the CALENOS satellite network confirms the findings of the simulation.
DTIC
Data Links; Telemedicine; Satellite Communication

20030033898 Patras Univ., Greece
A New Methodology to Design Distributed Medical Diagnostic Centers
Baziana, P. A.; Karavatselou, E. I.; Lymberopoulos, D. K.; Serpanos, D. N.; October 25, 2001; In English; Original contains color illustrations
Report No.(s): AD-A410378; No Copyright; Avail: CASI; A01, Hardcopy

In a Distributed Diagnostic Center (DDC), patients' examinations (exams) are performed in Remote Units (RUs) and the collected data (images, lab exams, etc) are sent to expertise Diagnostic Units (DUs) for evaluation. The DDC's quality of service per exam is considered through several factors, such as patient's wailing time, RU-DU communicating load, expert's occupancy, priority, administrative cost, etc. This paper introduces a new methodology for DDC design by controlling the above factors. We consider any RU through exams sources and any DU through exams' buffers and servers. Any exam created by a RU source is temporarily stored into a DU buffer and then is evaluated by a DU server. The proposed methodology is based on a buffers' model that evaluates the total RU-DU exams' traffic load, taking into account the sources' productivity and the exams' priority. Simulating the exams' delay in the sources, buffers and servers we affect the DDC's performance. Simulating results, using real data acquired by Hellenic DDCs of private domain, are also demonstrated in this paper.
DTIC
Telemedicine; Data Transmission

20030059036 Universidad de la Coruna, Spain
Design and Implementation of A DICOM PACS With Secure Access Via Internet
Pereira, J.; Lamelo, A.; Vazquez-Naya, J. M.; Fernandez, M.; Lopez-Gestal, J. M.; Oct. 25, 2001; In English
Report No.(s): AD-A411081; No Copyright; Avail: CASI; A01, Hardcopy

Among the last new developments in the field of teleradiology, a new system of telediagnostic which allows the remote

transmission of digital images via Internet is prevailing. These communications have to be made through mechanisms that guarantee the confidentiality and the integrity of the clinical data, as well as the authenticity of the transmitter. This system is, in many cases, the only way to diagnose the patient pathology in emergency rooms with no radiologist on call. Access to the medical data from any computer is possible through the implantation of a picture archiving and communication system (PACS) with direct acquisition from DiCOM equipment and Web technology. So, the radiologist with a computer connected to the WWW (from inside or outside the hospital) has access to the clinical histories and images. Free distribution software (Apache-PHP-MySQL) and PC platforms in WinNT environment has been used. All the medical imaging equipment of a medium size hospital has been connected to he system, integrating them with the medical history data. Restricted access based on privileges were design to make reports or only to consult data.
DTIC
Radiology; Internets; Telemedicine; Software Engineering; Data Transmission; Biomedical Data

20030061135 Coventry Univ., Coventry, UK
A Mobile Agent Framework for Telecardiology
Chao, K. M.; Anane, R.; Plumley, J.; Godwin, N.; Naguib, R. N. G.; October 25, 2001; In English
Report No.(s): AD-A411119; No Copyright; Avail: CASI; A01, Hardcopy

It is generally recognized that telecommunications and the internet in particular are changing the way health care is delivered in cardiology. Current implementations of telecardiology are often characterized by a centralized approach. Within this set-up a central system is connected to various remote sites. The central system has to keep track of the activities and of the state of these sites through constant communication with them. This scheme requires large volumes of data, particularly in the case of electrocardiograms (ECGs), to be generated in the remote sites and then to be transmitted to a central control system. This often leads to bottlenecks in communication that may adversely affect the quality of care. In this paper we propose a decentralized approach based on a combination of mobile agents (MA) and an Object Request Broker (ORB) mechanism. Its main aim is to support interoperability and to optimize the monitoring processes by reducing unnecessary communication. MAs possess a degree of autonomy that enables them to filter data on the remote site, and thus ease the load on the central monitoring system. They have the added advantage that they can be customized to meet individual needs. The ORB mechanism is incorporated in order to increase the reliability of MAs and to facilitate the integration of various ECG analysis software systems available on the market. It is expected that the proposed system will provide a framework for improved monitoring of patients and will lead therefore to better health care in cardiology.
DTIC
Electrocardiography; Telemedicine; Data Transmission; Cardiology

20020078188 Walter Reed Army Medical Center, Washington, DC USA
Teleophtalmology for Diabetic Retinopathy Screening
Ward, Thomas; Bauer, Robert; Sep. 2001; In English
Contract(s)/Grant(s): MIPR-9GBWFL9A05
Report No.(s): AD-A405316; No Copyright; Avail: CASI; A02, Hardcopy

Several studies have suggested that telemedicine techniques may be used to screen patients for signs of diabetic retinopathy. The objective of this research is to use nonmydriatic digital fundus cameras to collect retinal images at remote sites that can be transmitted and interpreted by an ophthalmologist. The present study has examined the validity of using digital fundus images to recognize the presence and extent of retinopathy in diabetic patients. Nonmydriatic, nonstereoscopic digital fundus images were reviewed for signs of diabetic retinopathy and results were compared with those of clinical examination of the same patients. Thirty patients (57 eyes) have been examined to date. Seven were found to have image quality too poor to evaluate. Poor image quality was attributable to dense cataracts, miotic pupils or total retinal detachment. Interpretation of fundus by digital image and clinical ophthalmoscopy showed consistent results in recognition of diabetic retinopathy (k=O.65 (95% CI 0.42-0.83)); macular edema (k=0.88 (95% CI 0.64- 1.11)) and follow-up recommendations (k=0.61 (95% CI 0.31-0.90)). These preliminary results suggest that digital fundus images may accurately recognize diabetic retinopathy.
DTIC
Telemedicine; Diseases; Medical Science

20040088697
Medicine in long duration space exploration: the role of virtual reality and broad bandwidth telecommunications networks
Ross, M. D., Author; Acta astronautica; Aug-Nov 2001; ISSN 0094-5765; Volume 49, Issue 3-10, 441-5; In English; Copyright; Avail: Other Sources

Safety of astronauts during long-term space exploration is a priority for NASA. This paper describes efforts to produce Earth-based models for providing expert medical advice when unforeseen medical emergencies occur on spacecraft. These models are Virtual Collaborative Clinics that reach into remote sites using telecommunications and emerging stereo-imaging and sensor technologies. c 2001. Elsevier Science Ltd. All rights reserved.
NLM
Aerospace Medicine; Broadband; Human-Computer Interface; Satellite Communication; Telecommunication; Telemedicine; Virtual Reality

20040118615
The future of space medicine
Nicogossian, A., Author; Pober, D., Author; Acta astronautica; Aug-Nov 2001; ISSN 0094-5765; Volume 49, Issue 3-10, 529-35; In English; Copyright; Avail: Other Sources

In November 2000, the National Aeronautics and Space Administration (NASA) and its partners in the International Space Station (ISS) ushered in a new era of space flight: permanent human presence in low-Earth orbit. As the culmination of the last four decades of human space flight activities. the ISS focuses our attention on what we have learned to date. and what still must be learned before we can embark on future exploration endeavors. Space medicine has been a primary part of our past success in human space flight, and will continue to play a critical role in future ventures. To prepare for the day when crews may leave low-Earth orbit for long-duration exploratory missions, space medicine practitioners must develop a thorough understanding of the effects of microgravity on the human body, as well as ways to limit or prevent them. In order to gain a complete understanding and create the tools and technologies needed to enable successful exploration. space medicine will become even more of a highly collaborative discipline. Future missions will require the partnership of physicians, biomedical scientists, engineers, and mission planners. This paper will examine the future of space medicine as it relates to human space exploration: what is necessary to keep a crew alive in space, how we do it today, how we will accomplish this in the future, and how the National Aeronautics and Space Administration (NASA) plans to achieve future goals.
NLM
Aerospace Medicine; Weightlessness

20040118619
The commercial alternative for biomedical and telemedical research in space
Hamill, D., Author; Harris, B. A. Jr, Author; Acta astronautica; Aug-Nov 2001; ISSN 0094-5765; Volume 49, Issue 3-10, 483-8; In English; Copyright; Avail: Other Sources

No abstract available
Aerospace Medicine; Commerce; Technology Transfer; Telemedicine; Weightlessness

20040101894
3D realtime echography and echography assisted by a robotic arm for investigating astronauts in the ISS from the ground
Arbeille, P., Author; Herault, S., Author; Roumy, J., Author; Porcher, M., Author; Besnard, S., Author; Vieyres, P., Author; Journal of gravitational physiology : a journal of the International Society for Gravitational Physiology; Jul 2001; ISSN 1077-9248; Volume 8, Issue 1, P143-4; In English; Copyright; Avail: Other Sources

As human will stay for long duration in isolated sites like ISS there will be a need to perform quick and reliable diagnosis to evaluate the gravity of the pathology in presence of clinical symptoms. Many pathological situations (abnormal heart rate, pericardic collection, mitral prolaps, cholecystis, renal lithiasis, normal and ectopic pregnancies, ovarian cyst, acute appendicitis, phlebitis ...) may occur even if all the astronauts are absolutely normal and healthy preflight. Ultrasound echography and Doppler are non invasive methods easy to use in space and very well adapted and used in routine for such diagnosis at the hospital. The objective of the present project was to design a method that guarantee a reliable echographic diagnostic in an isolated site (space station or earth site) by a Medical Doctor located at the expert site that should be the Nasa control center for ISS. It is supposed that there is only a non sonographer person in the isolated site and that the transmission system (audio, video, numeric..) is the only link between the 2 sites. Two options are proposed: (a) A 3D realtime acquisition echograph that can record quickly all the echos of a volume containing the organ suspected to have a lesion, all these echo information being sent to the ground and processed by the ground experts, (b) A robotic arm that hangs the echo probe in the isolated site tele-operated (through sattelite network) from the ground by an expert in clinical ultrasound. (As the expert moves

the joystick of his ground computer the robotic arm reproduces the same movements on the probe).
NLM
Aerospace Medicine; Astronauts; Real Time Operation; Robot Arms; Robotics; Sonograms; Telemedicine; Weightlessness

20020009055 Hawaii Univ., Honolulu, HI USA
UH Telemedicine Proposal
Friedman, Richard B.; Jun. 2001; In English
Contract(s)/Grant(s): DAMD17-99-2-9003
Report No.(s): AD-A396113; No Copyright; Avail: CASI; A03, Hardcopy

The purpose of the University of Hawaii Telemedicine Project (UHTP) is to assess and establish an effective telemedicine curriculum uniquely tailored for the training of military healthcare personnel. To accomplish this task, a clinical telemedicine service was established such that a hub of physician specialists in Honolulu is available to primary care providers and patients in rural and/or remote clinics; and from this experience a web-based educational curriculum to teach military and other health care providers how to use telemedicine was designed. This Project was supported by a two-year Cooperative Agreement between the University of Hawaii John A. Burns School of Medicine (JABSOM) and the Department of Defense, USA Army Medical Research Acquisition Activity, Telemedicine and Advanced Technology Research Center (TATRC).
DTIC
Telemedicine; Education; Defense Program; Clinical Medicine

20010066266 National Medical Univ., Kiev, Ukraine
Partnership in Ukraine Ministry of Health and Academy of Medical Sciences Scientific Direction of 'Aerospace Medicine'
Yatsenko, Valentine; The Impact of NATO/Multinational Military Missions on Health Care Management; May 2001, 14-1 - 14-4; In English; Copyright; Avail: CASI; A01, Hardcopy

The scientific direction of 'Aerospace Medicine' was generated in 1996 under the Ministry of Health (MOH) and the Academy of Medical Sciences (AMS) of Ukraine with the purpose: To link up the scientific potential of the MOH and the AMS of Ukraine for the solution of fundamental and applied problems of aviation and space medicine; To coordinate the partner relationships with establishments of a National Academy of Sciences, National Space Agency, Ministry of Defense of Ukraine and other departments; To advance international cooperation. To realize these objectives, seven scientific commissions have been set up, which cover the following topics: (1) Space Ecology; (2) Space Biotechnology; (3) Space Radiation Medicine; (4) Space Pharmacology and Toxicology; (5) Space Biomedicine; (6) Telemedicine; and (7) Aerospace Medicine.
Derived from text
Health; Medical Science; Aerospace Medicine; International Cooperation

20040112473
Evolution of telemedicine in the space program and earth applications
Nicogossian, A. E., Author; Pober, D. F., Author; Roy, S. A., Author; Telemedicine journal and e-health : the official journal of the American Telemedicine Association; Spring 2001; ISSN 1530-5627; Volume 7, Issue 1, 1-15; In English; Copyright; Avail: Other Sources

Remote monitoring of crew, spacecraft, and environmental health has always been an integral part of the National Aeronautics and Space Administration's (NASA's) operations. Crew safety and mission success face a number of challenges in outerspace, including physiological adaptations to microgravity, radiation exposure, extreme temperatures and vacuum, and psychosocial reactions to space flight. The NASA effort to monitor and maintain crew health, system performance, and environmental integrity in space flight is a sophisticated and coordinated program of telemedicine combining cutting-edge engineering with medical expertise. As missions have increased in complexity, NASA telemedicine capabilities have grown apace, underlying its role in the field. At the same time, the terrestrial validation of telemedicine technologies to bring healthcare to remote locations provides feedback, improvement, and enhancement of the space program. As NASA progresses in its space exploration program, astronauts will join missions lasting months, even years, that take them millions of miles from home. These long-duration missions necessitate further technological breakthroughs in tele-operations and autonomous technology. Earth-based monitoring will no longer be real-time, requiring telemedicine capabilities to advance with future explorers as they travel deeper into space. The International Space Station will serve as a testbed for the telemedicine

technologies to enable future missions as well as improve the quality of healthcare delivery on Earth.
NLM
Histories; Space Programs; Telemedicine

20040115731
[The concept of the use of information complexes of the Russian space industry in the telemedicine program]
Solov'ev, V. A., Author; Lobachev, V. I., Author; Udaloi, V. A., Author; Pronin, M. L., Author; Gorul'ko, Iu D., Author; Orlov, O. I., Author; Pobedonostsev, K. A., Author; Peshekhonov, A. B., Author; Aviakosmicheskaia i ekologicheskaia meditsina = Aerospace and environmental medicine; 2001; ISSN 0233-528X; Volume 35, Issue 5, 65-7; In Belorussian; Copyright; Avail: Other Sources

No abstract available
Industries; Information Management; Telemedicine

20020041537 Naval Health Research Center, San Diego, CA USA
A Prospective Evaluation of Telemedicine in Remote Naval Populations Seeking Specialty Care
Melcer, Ted; Hunsaker, Darrell; Crann, Bobbi; Caola, Lisa; Deniston, William; Jan. 05, 2001; In English
Contract(s)/Grant(s): GS09K00BHD1104
Report No.(s): AD-A400175; NAVHLTHRSCHC-01-4D; No Copyright; Avail: CASI; A03, Hardcopy

Telemedicine technologies, such as Internet and live videoteleconferencing (VTC), have great potential to provide specialty care for naval personnel in remote treatment facilities at sea or onshore. This study focused on the clinical impact of ear/nose/throat (ENT) consultations conducted via live VTC during a planned, four-month study period in TRICARE Region 9. Also, interviews of physician and non-physician medical personnel assessed their attitudes and recent use of telemedicine. A total of 193 ENT consultations were conducted following referrals from primary providers at remote MTFs. Patients were mostly young, active duty military personnel. Nearly half (45%) of these consultations led to changed diagnosis by ENT specialist relative to initial diagnosis by primary provider. This rate of clinical impact generalized across different ENT conditions (e.g., tonsil, upper respiratory, hearing), age, military status and MTFs. Medical personnel reported positive attitudes on telemedicine technologies and the telemedicine process. Non-physicians reported slightly more positive attitudes than physicians and used telemedicine more often and in more ways than did physicians. These results replicated and extended a recent retrospective study on Region 9 telemedicine. The telemedicine process for specialty ENT care in Region 9 produced robust clinical impact and the medical personnel reacted very favorably.
DTIC
Physicians; Telemedicine; Military Technology

20010019791 Mayo Clinic, Rochester, MN USA
NASA/DARPA ACTS Project for Evaluation of Telemedicine Outreach Using Next-Generation Communications Satellite Technology: Mayo Clinic Participation
Khandheria, Bijoy K.; Gilbert, Barry; Mitchell, Marvin P.; Bengali, Abdul; Proceeding of the Advanced Communications Technology Satellite (ACTS) Conference 2000; December 2000, 103-108 and 251; In English; No Copyright; Avail: CASI; A02, Hardcopy

To describe the development of telemedicine capabilities - application of remote consultation and diagnostic techniques - and to evaluate the feasibility and practicality of such clinical outreach to rural and underserved communities with limited telecommunications infrastructures.
Author
Telemedicine; Feasibility Analysis; Procedures

20010019792 NASA Glenn Research Center, Cleveland, OH USA
ACTS Satellite Telemammography Network Experiments
Kachmar, Brian A.; Kerczewski, Robert J.; Proceeding of the Advanced Communications Technology Satellite (ACTS) Conference 2000; December 2000, 109-115 and 253-260; In English; No Copyright; Avail: CASI; A03, Hardcopy

The Satellite Networks and Architectures Branch of NASA's Glenn Research Center has developed and demonstrated several advanced satellite communications technologies through the Advanced Communications Technology Satellite (ACTS) program. One of these technologies is the implementation of a Satellite Telemammography Network (STN) encompassing NASA Glenn, the Cleveland Clinic Foundation. the University of Virginia, and the Ashtabula County Medical Center. This

paper will present a look at the STN from its beginnings to the impact it may have on future telemedicine applications. Results obtained using the experimental ACTS satellite demonstrate the feasibility of Satellite Telemammography. These results have improved teleradiology processes and mammography image manipulation, and enabled advances in remote screening methodologies. Future implementation of satellite telemammography using next generation commercial satellite networks will be explored. In addition, the technical aspects of the project will be discussed, in particular how the project has evolved from using NASA developed hardware and software to commercial off the shelf (COTS) products. Development of asymmetrical link technologies was an outcome of this work. Improvements in the display of digital mammographic images, better understanding of end-to-end system requirements, and advances in radiological image compression were achieved as a result of the research. Finally, rigorous clinical medical studies are required for new technologies such as digital satellite telemammography to gain acceptance in the medical establishment. These experiments produced data that were useful in two key medical studies that addressed the diagnostic accuracy of compressed satellite transmitted digital mammography images. The results of these studies will also be discussed.
Author
Telecommunication; Telemedicine; Radiology; Computer Programs; ACTS

20010069804 Naval Health Research Center, San Diego, CA USA
A Retrospective Evaluation of Telemedicine in Remote Naval Populations Seeking Specialty Care
Mlecer, Ted; Crann, Bobbi; Hunsaker, Darrell; Deniston, William; Caola, L.; Dec. 2000; In English
Contract(s)/Grant(s): GS09KOOBHD1104; Proj-M2332
Report No.(s): AD-A390728; NHRC-01-02; No Copyright; Avail: CASI; A03, Hardcopy

Telemedicine technologies, such as internet and live videoteleconferencing (vTC), have great potential to provide specialized health care for naval personnel in remote situations at sea or onshore. A retrospective evaluation was conducted on telemedicine use%in TRICARE Region Nine which has a hub military treatment facility (MTF) at Naval Medical Center, San Diego providing specialty consultations for seven remote MTFs in southern California. A total of I 364 telemedicine consultations by VTC (76%) and store-and forward (24%) modalities were analyzed. Substantial variation in telemedicine use was seen among the MTFs (Port Hueneme = 352 consults; Vandenburg = 45 consults). The rate of telemedicine use for specialty care in TRICARE Region Nine increased regularly and substantially with the age of the telemedicine systems (time since operational); this finding generalized across MTFs and several medical specialties. Preliminary data indicated that diagnoses changed in 49% of consultations. The relatively high rate of telemedicine use for specialty care seen in this network makes TRICARE Region Nine an excellent system for study. Quantitative models including factors that predict use and clinical impact of telemedicine for specialty care in remote MTFs would provide valuable guidance for application of such technologies on small ships at sea.
DTIC
Clinical Medicine; Medical Services; Telemedicine; Military Air Facilities; Health

20010012953 SRI International Corp., Menlo Park, CA USA
Telepresence Microsurgery for USUHS
Shimon, Jeffrey J.; Sep. 2000; In English
Contract(s)/Grant(s): DAMD17-99-2-9030
Report No.(s): AD-A383932; No Copyright; Avail: CASI; A02, Hardcopy

The research discussed herein involves the development of a remote slave micromanipulator unit (RSMU) for the Uniformed Services University of the Health Sciences (USUHS) in Bethesda, MD. The RSMU will extend the capabilities of existing telepresence surgery systems (TeSS) installed at both SRI and USUHS for microsurgical procedures. The scope of this research includes the redesign of an existing RSMU prototype, the production of the improved RSMU for USUHS, the integration of the new RSMU with existing TeSS master consoles, and technical support for testing and evaluation of the new system by USUHS surgeons and personnel. Design of the existing RSMU prototype and production of the improved RSMU is complete. Qualitative evaluation of the upgraded RSMU at SRI shows it is possible to manipulate microsurgical sutures. However, improvements are indicated to alleviate deficiencies with the master console and video imaging system.
DTIC
Teleoperators; Man Machine Systems; Surgery; Design Analysis; Aerospace Medicine

20000054671 NASA Glenn Research Center, Cleveland, OH USA

Monitoring Astronaut Health at the Nanoscale Cellular Level Through the Eye

Ansari, Rafat R.; Singh, Bhim S.; Rovati, Luigi; Docchio, Franco; Sebag, Jerry; April 2000; In English; 3rd, 23-28 Jan. 2000, Houston, TX, USA

Contract(s)/Grant(s): RTOP 101-51-00

Report No.(s): NASA/TM-2000-210041; NAS 1.15:210041; E-12243; No Copyright; Avail: CASI; A03, Hardcopy

A user friendly goggles-like head-mounted device equipped with a suite of instruments for several non-invasive and quantitative medical evaluation of the eye, skin, and brain is desired for monitoring the health of astronauts during space travel and exploration of neighboring and distant planets. Real-time non-invasive evaluation of the different structures within the above organs can provide indices of the health of not just these organs, but the entire body. The techniques such as dynamic light scattering (for the early detection of uveitis, cholesterol levels, cataract, changes in the vitreous and possibly Alzheimer's disease), corneal autofluorescence (to assess extracellular matrix biology e.g., in diabetes), optical activity measurements (of anterior ocular fluid to evaluate blood-glucose levels), laser Doppler velocimetry (to assess retinal, optic nerve, and choroidal blood flow), reflectometry/oximetry (for assessing ocular and central nervous system oxygen metabolism), optical coherence tomography (to determine retinal tissue microstructure) and possibly scanning laser technology (for intraocular tissue imaging and scanning) will he integrated into this compact device. Skin sensors will also be mounted on the portion of the device in contact with the periocular region. This will enable monitoring of body temperature, EEG, and electrolyte status. This device will monitor astronaut health during long-duration space travel by detecting aberrations from pre-established 'nonns', enabling prompt diagnosis and possibly the initiation of early preventative/curative therapy. The non-invasive nature of the device technologies permits frequent repetition of tests, enabling real-time complete crew health monitoring. This device may ultimately be useful in tele-medicine to bring modern healthcare to under-served areas on Earth as well as in so-called 'advanced' care settings (e.g. diabetes in the USA).

Author

Aerospace Medicine; Detection; Diagnosis; Diseases; Eye (Anatomy); Health; Optical Measurement; Spacecrews; Medical Equipment; Telemedicine; Medical Electronics; Biotelemetry; Bioastronautics

20000064584 NASA Ames Research Center, Moffett Field, CA USA

Bridging the Gap from Networking Technologies to Applications: Workshop Report

Johnson, Marjory J.; desJardins, Richard; February 2000; In English; No Copyright; Abstract Only; Available from CASI only as part of the entire parent document

The objective of the Next Generation Internet (NGI) Federal program is threefold, encompassing development of networking technologies, high-performance network testbeds, and revolutionary applications. There have been notable advances in emerging network technologies and several nationwide testbeds have been established, but the integration of emerging technologies into applications is lagging. To help bridge this gap between developers of NGI networking technologies and developers of NGI applications, the NASA Research and Education Network (NREN) project hosted a two-day workshop at NASA Ames Research Center in August 1999. This paper presents a summary of the results of this workshop and also describes some of the challenges NREN is facing while incorporating new technologies into HPCC and other NASA applications. The workshop focused on three technologies - Quality of Service (QoS), advanced multicast, and security-and five major NGI application areas - telemedicine, digital earth, digital video, distributed data-intensive applications, and computational infrastructure applications. Network technology experts, application developers, and NGI testbed representatives came together at the workshop to promote cross-fertilization between the groups. Presentations on the first day, including an overview of the three technologies, application case studies and testbed status reports, laid the foundation for discussions on the second day. The objective of these latter discussions, held within smaller breakout groups, was to establish a coherent picture of the current status of the various pieces of each of the three technologies, to create a roadmap outlining future technology development, and to offer technological guidance to application developers. In this paper we first present a brief overview of the NGI applications that were represented at the workshop, focusing on the identification of technological advances that have successfully been incorporated in each application and technological challenges that remain. Next we present the technology roadmaps that were created at the workshop, summarizing the status of various mechanisms that are currently under development and forecasting when various advances are likely to occur within the next one-to-three-year time span. Then we identify issues that were raised at the workshop that might hinder technology development or that might impede integration into NGI applications. We also report some specific guidelines that were offered at the workshop to enable application developers to integrate and effectively use emerging NGI technology building blocks. Finally, we describe NREN activities to incorporate emerging technologies into NASA applications. These activities include support for other NASA High-Performance Computing and Communications Program areas such as IPG (Information Power

Grid), support for NASA science enterprises such as Earth science and Mars program prototyping activities, support for satellite/terrestrial networking applications such as the TransAtlantic and TransPacific demonstrations and the Interplanetary Internet, support for NASA telemedicine applications such as the Virtual Collaborative Clinic, and participation in NGI advanced technology testbed initiatives such as the QBone and the NTON/Supernet. For each activity we highlight the primary technological challenge that is associated with it.
Author
Internets; Software Engineering; Technology Utilization; Internet Resources

20000111088 Wyle Labs., Inc., Houston, TX USA
Medical Training Issues and Skill Mix for Exploration Missions
Janney, R. P.; Armstrong, C. W.; Stepaniak, P. C.; Billica, Roger, Technical Monitor; [2000]; In English, 14-18 May 2000, Houston, TX, USA; No Copyright; Avail: Other Sources; Abstract Only

The approach for treating in-flight medical events during exploration-class missions must reflect the need for an autonomous crew, and cannot be compared to current space flight therapeutic protocols. An exploration mission exposes the crew to periods of galactic cosmic radiation, isolation, confinement, and microgravity deconditioning far exceeding the low-Earth orbital missions performed to date. In addition, exploration crews will not be able to return to Earth at the onset of a medical event and will need to control the situation in-flight. Medical consultations with Earth-based physicians will be delayed as much as 40 minutes, dictating the need for a highly-trained medical team on board. This presentation will address the mix of crew medical skills and the training required for crew health care providers for missions beyond low-Earth orbit. Both low- and high-risk options for medical skill mix and preflight training will be compared.
Author
Medical Personnel; Aerospace Medicine; Telemedicine; Space Exploration

20000021213 Institute of Space Medico-Engineering, Beijing China
Space Medicine and Medical Engineering (Hangtian Yixue yu Yixue Gongcheng), Volume 12, No. 4, August 1999
Wei, J.; Aug. 1999; In Mixed
Report No.(s): PB2000-102517; No Copyright; Avail: CASI; A05, Hardcopy

Partial Contents: Biochemical Changes of Plasma in Paratroops after Parachuting: A Preliminary Investigation; Ultrastructural Changes of Arterial Wall from Different Body Parts of Rats during Simulated Weightlessness; Computer Simulation of Cardiovascular Response to Lower Body Negative Pressure; Effects of Acute Mild and Moderate Hypoxia on Human Short Memory; Development of a Multi-channel Physiological Telemetry System; Thermodynamic Analysis of Saturation Degree of O2 in Myoglobin and Hemoglobin; Telemedicine--Technology, Application, Evaluation and Prospect. NTIS
Aerospace Medicine; Telemedicine; Biotelemetry

20000026324 Massachusetts Inst. of Tech., Cambridge, MA USA
Undergraduate Program Flights - NIMBLE: A Non-Invasive Microgravity Biomedical Life-Sciences Experiment
Carr, Christopher; Walker, Elizabeth; Pinson, David; KC-135 and Other Microgravity Simulations; August 1999, 108-110; In English; Original contains color illustrations; No Copyright; Avail: CASI; A01, Hardcopy

The objectives of this project are to verify the effects of micro- and hypergravity on the heart rate on humans to test the usability of the wearable computer-based bio-monitoring system. Passively collected pulse-oximetry and ECG data will be used to test the effects of micro-and hypergravity on the heart rate of humans. A workload task, which requires the flight crew to integrate information from the external and internal (on-screen) environments, will be used in conjunction with a subjective evaluation to test the hypothesis of system usability.
Derived from text
Gravitational Effects; Microgravity; Oximetry; Aerospace Medicine; Medical Equipment; Electrocardiography

20040120204
Telemedicine for the International Space Station
Wilke, D., Author; Padeken, D., Author; Weber, T. h., Author; Gerzer, R., Author; Acta astronautica; Apr-Jun 1999; ISSN 0094-5765; Volume 44, Issue 7-12, 579-81; In English; Copyright; Avail: Other Sources

The medical care for the integrated crew of the International Space Station (ISS) will require close co-operation between the partner agencies in the areas of selection, medical surveillance, countermeasures, and handling of acute medical problems.

Based on a commonly accepted policy of shared care and responsibilities medical guidelines, procedures, and standards for medical data and communication need to be harmonised under the responsibility of the Multilateral Medical Operations Panel (MMOP). A supporting telemedical network connecting the partners on an organisational and technical level will facilitate the harmonisation process and provide new tools for effective co-operation between medical professionals. Earth bound projects with similar application areas can profit from and contribute to this development and need to be considered for efficient implementation and exploitation.
NLM
Aerospace Medicine; International Space Station; Telemedicine

20040088983
Space analogue studies in Antarctica
Lugg, D., Author; Shepanek, M., Author; Acta astronautica; Apr-Jun 1999; ISSN 0094-5765; Volume 44, Issue 7-12, 693-9; In English; Copyright; Avail: Other Sources

Medical research has been carried out on the Australian National Antarctic Research Expeditions (ANARE) for 50 years. As an extension of this program collaborative Australian/USA research on immunology, microbiology, psychology and remote medicine has produced important data and insight on how humans adapt to the stress of extreme isolation, confinement and the harsh environment of Antarctica. An outstanding analogue for the isolation and confinement of space missions (especially planetary outposts), ANARE has been used as an international research platform by Australia and the USA since 1993. Collaborative research has demonstrated a lowered responsiveness of the immune system under the isolation and confinement of Antarctic winter-over; a reduction of almost 50% in T cell proliferation to mitogen phytohaemogglutinin, as well as changes in latent herpesvirus states and the expansion of the polyclonal latent Epstein-Barr virus infected B cell populations. Although no clinically significant disease has been found to result from these immune changes, research is currently assessing the effects of psychological factors on the immune system. This and associated research performed to date and its relevance to both organisations is discussed, and comment made on possible extensions to the program in both medical and other fields.
NLM
Adaptation; Analogs; Antarctic Regions; Immunity; Social Isolation; Space Environment Simulation

20000085965 Texas Univ., Galveston, TX USA, Kelsey Seybold, USA
Women's Health Issues in the Space Environment
Jennings, Richard T.; [1999]; In English, 14-28 May 2000, Houston, TX, USA; No Copyright; Avail: Other Sources; Abstract Only

Women have been an integral part of US space crews since Sally Ride's mission in 1983, and a total of 40 women have been selected as US astronauts. The first Russian female cosmonaut flew in 1963. This presentation examines the health care and reproductive aspects of flying women in space. In addition, the reproductive implications of delaying one's childbearing for an astronaut career and the impact of new technology such as assisted reproductive techniques are examined. The reproductive outcomes of the US female astronauts who have become pregnant following space flight exposure are also presented. Since women have gained considerable operational experience on the Shuttle, Mir and during EVA, the unique operational considerations for preflight certification, menstruation control and hygiene, contraception, and urination are discussed. Medical and surgical implications for women on long-duration missions to remote locations are still evolving, and enabling technologies for health care delivery are being developed. There has been considerable progress in the development of microgravity surgical techniques, including laparoscopy, thoracoscopy, and laparotomy. The concepts of prevention of illness, conversion of surgical conditions to medically treatable conditions and surgical intervention for women on long duration space flights are considered.
Author
Aerospace Environments; Females; Health; Reproduction (Biology); Astronauts; Aerospace Medicine

20000085958 NASA Johnson Space Center, Houston, TX USA
Space Medicine: A Surgeon's Perspective
Dawson, David L.; [1999]; In English, 22-23 Oct. 1999, Des Moines, IA, USA; No Copyright; Avail: Other Sources; Abstract Only

For the first four decades of human space flight NASA's priorities in life sciences and medical programs have been preventative medicine (astronaut selection and training); assessment of the physiologic effects of microgravity and other unique aspects of space flight, implementation of countermeasures to protect against adverse effects, and amelioration of these

adverse effects. Because most of the U.S. space flight experience has been on short duration missions, the need for medical and diagnostic treatment capabilities have been limited.The first long-term crews will arrive on the International Space Station (ISS) in early 2000. This will usher in a new era, an era of sustained human presence in Low Earth Orbit. One of the principal purposes of the ISS program is to increase the knowledge of the effects of long duration space flight on humans, a pre-requisite to future exploration class missions beyond Low Earth Orbit (e.g., a return to the Moon or an exploration of Mars). Areas of particular interest include protection from radiation, muscle atrophy, bone loss, cardiovascular alterations, immune dysfunction, adverse psychological response to hazards and confinement, and neurovestibular alterations. In addition, long duration space flight requires the development of autonomous medical care capabilities, as the distances involved eliminate the possibility of real-time telemedicine or robotic intervention, and prevent a mission abort and a rapid return to Earth. The objectives of this presentation include: 1. A description of the International Space Station project, including its research facilities and on-orbit medical capabilities; 2. An overview of the physiological and medical problems associated with microgravity in space flight; 3. A review of NASA's biomedical research priorities and ongoing work to develop clinical care capabilities for space flight crews (including surgical interventions) and; 4. An overview of current and proposed research priorities for NASA Research Announcements, NASA Space Biomedical Research Institute, Small Business Innovation Research Grant, and other funding sources.
Author
Aerospace Medicine; Surgeons; Manned Space Flight; International Space Station; Physiological Responses

19990024879 Baylor Coll. of Medicine, Houston, TX USA
Development of Telemedicine Capabilities for a Joint US-Russian Space Biomedical Center for Training and Research
DeBakey, Michael E.; Dec. 31, 1998; In English
Contract(s)/Grant(s): NCC9-36; No Copyright; Avail: CASI; A02, Hardcopy

From the perspective of scheduling, some medical consultations can have asynchronous and synchronous components. Consultations frequently involve the compilation of patient data, its analysis, a consultant's report, and a real-time conference between the referring physician and the consultant. The bandwidth of the Internet with Moscow and advances in the hardware and software of personal computing now make possible telemedicine events with store-and-forward components and real-time components. These are hybrid telemedicine and this paper describes such a case.
Author
Telemedicine; Education; Real Time Operation; Conferences; Synchronism

19990025670 Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine, France
Aeromedical Support Issues in Contingency Operations
September 1998; In English; In French, 29 Sep. - 1 Oct. 1997, Rotterdam, Netherlands
Report No.(s): AGARD-CP-599; Copyright; Avail: CASI; A18, Hardcopy

These proceedings include the Technical Evaluation Report, two Keynote Addresses, 53 papers and the edited discussions of the Symposium sponsored by the North Atlantic Treaty Organization (NATO/RTO) Aerospace Medical Panel. It was held in Rotterdam, N-E from 29 September - 1 October 1997. Contingency Operations constitute military missions such as peacekeeping, humanitarian aid, peacemaking/enforcement, full scale offensive operations and relief operations other than war, such as aid to civil powers in counterterrorism and in natural disasters. Increasingly, these operations will involve greater NATO participation in the post 'Post-Cold-War' era. Significantly, NATO nations are turning to the application of science and technology, particularly computer resources, to address the unique problems associated with Contingency Operations. From a medical standpoint, there are many logistic, support and environmental factors which impede effective health and critical care medicine in Contingency Operations. This Symposium considered both the aeromedical problems encountered and the role of technological solutions as aids to resolving the issues in: (a) sustained and continuous operations, (b) medical management in remote locations, (c) medical information, and (d) adaptation to operational conditions. These proceedings will be of interest to heads of military health services, military and civilian officers concerned with the health and safety of personnel in air and support operations, research scientists, and those requiring a state-of-the-art review of medical 'lessons learned' in Contingency Operations.
Author
Conferences; Contingency; Medical Services; Operations Research; Research and Development; Human Factors Engineering; Medical Personnel; Telemedicine; Medical Equipment; Life Support Systems; Aerospace Medicine; Biological Effects; Aircraft Safety

19990025711 Military Satellite Command, Hanscom AFB, MA USA

Evolution of a Global Military and Civilian Telemedicine Network for the 21st Century: Near Future on Demand, Space Based Delivery of Multimedia Services

Evans, John A.; Davidson, Frank; Sanders, Jay; McInerney, Thomas G.; Brandon, William T.; Row, Lockard M.; September 1998; In English; Copyright; Avail: CASI; A03, Hardcopy

This paper stresses the more recent intraregional telemanagement and telemedicine efforts and synthesizes key success factors essential for evolving self-sustaining global telemanagement and telemedicine networks for the twenty-first century. Finally, future directions are proposed which could adapt these kinds of networks to bring about healthier military and civilian communities.

Derived from text

Telemedicine; Biotelemetry; Medical Electronics; Teleconferencing; Telecommunication; Military Operations

19990025712 Army Medical Research and Development Command, Fort Detrick, MD USA

Telemedicine in Support of Operations in Remote Locations

Morris, Tommy; Vandre, Robert H.; Rocca, Mitra; Roller, Jeffrey I.; Salisbury, Timothy; September 1998; In English; Copyright; Avail: CASI; A01, Hardcopy

USA military services deploy to isolated locations with integral medical support. In most small deployments the unit has a General Medical Officer and/ or a Physician's Assistant as well as a compliment of Medics to provide primary medical care to the assigned personnel. The goal of telemedicine is increase the quality of care given to the soldiers by providing access to specialty providers utilizing satellite communications and commercial off the shelf technologies.

Derived from text

Telemedicine; Deployment; Medical Science; Medical Equipment; Medical Electronics; Biotelemetry

19990025714 Georgetown Univ., Washington, DC USA

Light Weight and Portable Telemedicine Workstations: The MUSTPAC Experience

Macedonia, Christian R.; Littlefield, Rik; Eglinton, Gary; Skelly, Larry; September 1998; In English; Copyright; Avail: CASI; A01, Hardcopy

Advanced imaging and telecommunications capabilities are becoming commonplace in major university hospitals. The availability od such services to people in remote or deployment environments is not always certain. To address this issue, the US Army and Battelle Memorial Institute developed a family of telemedicine workstations. One device, the MUSTPAC (Medical UltraSound, Three-dimensional and Portable with Advanced Communications) was deployed to the 212th Mobile Army Surgical Hospital in Tuzla, Bosnia-Herzegonvina in a feasibility study investigating its potential as a remote diagnostic tool.

Author (revised)

Telemedicine; Imaging Techniques; Ultrasonics; Military Operations

19990025715 Air Force Medical Center, Lackland AFB, TX USA

StatRad: A Portable Imaging Center for Remote/Hostile Environments

Freckleton, M. W.; Johnson, Thomas G.; September 1998; In English; Copyright; Avail: CASI; A01, Hardcopy

Until very recently, radiological imaging centers have been restricted to large medical institutions within large, fixed facilities. Although there is no diminution in the need for factors including equipment size, weight, power/water supply, narrow temperature thresholds, etc., have precluded all but the most rudimentary radiological imaging in austere locations. StatRad is an ongoing effort to develop not only imaging equipment, but the components of an integrated and scaleable imaging center for use in circumstances which cannot be controlled for environmental factors, and where the medical response must rapid and decisive.

Derived from text

Imaging Techniques; Radiology; Image Classification; Image Enhancement; Aerospace Medicine

20040112186

Symposium on Space Medicine

Pool, S. L., Principal Investigator; Texas medicine; Feb 1998; ISSN 0040-4470; Volume 94, Issue 2, 40-80; In English; Copyright; Avail: Other Sources

No abstract available

Aerospace Medicine; Conferences; Technology Transfer; Weightlessness

19990025827 NASA Johnson Space Center, Houston, TX USA

Preparing for Human Exploration

Drake, Bret G.; Joosten, B. Kent; HEDS-UP Mars Exploration Forum; 1998, 69-80; In English; No Copyright; Avail: CASI; A03, Hardcopy

NASA's Human Exploration and Development of Space (HEDS) Enterprise is defining architectures and requirements for human exploration that radically reduce the costs of such missions through the use of advanced technologies, commercial partnerships and innovative systems strategies. In addition, the HEDS Enterprise is collaborating with the Space Science Enterprise to acquire needed early knowledge about Mars and to demonstrate critical technologies via robotic missions. This paper provides an overview of the technological challenges facing NASA as it prepares for human exploration. Emphasis is placed on identifying the key technologies including those which will provide the most return in terms of reducing total mission cost and/or reducing potential risk to the mission crew. Top-level requirements are provided for those critical enabling technology options currently under consideration.

Author

Cost Reduction; Manned Mars Missions; Bioastronautics; Aerospace Medicine; Closed Ecological Systems; Radiation Tolerance; Weightlessness; Planetary Environments; Medical Science; Life Support Systems; Environmental Engineering; Physiological Effects; Human Factors Engineering; Spacecraft Propulsion

19980237894 Massachusetts Inst. of Tech., Cambridge, MA USA

Human Factors in Tele-Inspection and Tele-Surgery (ARPA)

Sheridan, Thomas B.; Hu, Juanjuen; Thompson, James M.; Jan. 1998; In English

Contract(s)/Grant(s): DAMD17-94-C-4125

Report No.(s): AD-A354117; No Copyright; Avail: CASI; A07, Hardcopy

Closed loop control of a telemanipulator such as is used for telesurgery is intolerant to loop time delay of more than 0.05 second. Such a system goes unstable, especially when force feedback is employed. The time delay inherent in modem high-bandwidth communication channels such as satellite or ISDN telephone systems is mostly attributable to required modulation/demodulation time, and can easily exceed 0.5 second. (1) This research applies a new approach, called fuzzy sliding control, to smooth out and stabilize teleoperation with time delay in the force and visual feedback. A demonstration system was built and fuzzy sliding control was evaluated relative to other control methods operating under time delay. While still not a perfect solution, it provided better stabilization than other methods. (2) This research tests the hypothesis that if video signals must be delayed due to modulation/demodulation as required by the channel, it may be better to send control signals by a faster method if possible, even if that means force feedback will not arrive in synchrony with vision or audio feedback. Experimental trials of various laparoscopic telesurgical tasks were performed with the surgeon remote from the patient and a paramedical assistant local to the patient. Results clearly showed that whenever the remote surgeon operated laparoscopic instruments (as compared to adjusting the laparoscope and letting the assistant do the actual surgery) the asynchronous feedback was better.

DTIC

Human Factors Engineering; Surgery; Telemedicine; Research; Evaluation; Performance Tests

20040089316

Internet technologies and requirements for telemedicine

Lamaster, H., Author; Meylor, J., Author; Meylor, F., Author; Minimally invasive therapy & allied technologies : MITAT : official journal of the Society for Minimally Invasive Therapy; Dec 1997; ISSN 1364-5706; Volume 6, Issue 5-6, 436-43; In English; Copyright; Avail: Other Sources

Internet technologies are briefly introduced and those applicable for telemedicine are reviewed. Multicast internet technologies are described. The National Aeronautics and Space Administration (NASA) 'Telemedicine Space-bridge to Russia' project is described and used to derive requirements for internet telemedicine. Telemedicine privacy and Quality of Service (QoS) requirements are described.

NLM

Computer Networks; Computer Security; Internets; Telecommunication; Telemedicine

20010045640 Kensal Consulting, Tucson, AZ USA

Dual Use Telemedicine Support System for Pathology

Preston, Kendall; Conti, Diane; Oct. 1997; In English

Contract(s)/Grant(s): DAMD17-94-J-4500

Report No.(s): AD-A343181; No Copyright; Avail: Defense Technical Information Center (DTIC)

The research reported here involves upgrading the technology of the two telepathology workstations (TSS) previously built under this grant and the design and fabrication of the more compact PC Microscope (PCM). The TSS are being retrofitted to incorporate a diode array with a seven micrometer spacing. Enhancements have been made to the system software to simplify the user interface. The Luke Mayo 1996 Telepathology Study concluded that the TSS does permit full specimen, full color imaging that can be displayed on the computer screen, successfully transmitted for remote consultation by ISDN, and conveniently archived for future reference (Virtual Microscopy). For the PCM: (1) The PCI Stepper Motor Control Printed Circuit Board has been designed and is being fabricated. (2) Electronic imaging hardware has been designed and developed. (3) Two test enclosures for the video camera have been designed, developed and fabricated. (4) Fabrication drawings for and initial testing of the optical and mechanical systems have been completed. (5) The software logic and interface necessary for each of the user modes have been implemented. An extension of time is requested to complete all TSS retrofits, complete the PCM, and establish solid experiments using the TSS and the PCM. No additional funds are required.
DTIC
Pathology; Telemedicine; Support Systems; Information Systems; Aerospace Medicine

19970036305 NASA Lewis Research Center, Cleveland, OH USA
System Design and Applications of the Ultra Small Aperture Terminal with the Advanced Communications Technology Satellite
Reinhart, Richard C.; Aug. 1997; In English; 3rd, 15-18 Sep. 1997, Sorrento, Italy
Contract(s)/Grant(s): RTOP 315-90-2A
Report No.(s): NASA-TM-107536; NAS 1.15:107536; E-10858; No Copyright; Avail: CASI; A03, Hardcopy

NASA's Advanced Communications Technology Satellite (ACTS), is demonstrating new technologies in communication systems at Ka-Band. One such technology is small size ground stations capable of modest data rates for interactive communications. Industry has shown interest in these small terminals for the commercial and consumer markets. The advanced technologies of Ka-Band systems such as high gain spot beams allow user ground stations to carry acceptable traffic with small antenna's and low power transmitters resulting in lower cost satellite ground stations. The Lewis Research Center's Space Communications Program has developed small ground stations referred to as an Ultra Small Aperture Terminal (USAT) available for use by experimenters to use the ACTS satellite for technology development and demonstration. The Ultra Small Aperture Terminal consists of a 35cm or 60 cm antenna, solid state power amplifiers (SSPA) ranging from 1/4 Watt to 4 Watt, 4.0 dB noise figure receivers, a 70 Mhz user interface, and the necessary upconverter and downconverter equipment for proper frequency translation to Ka-band. Once thought suitable only for low kilobit data rate applications such as Supervisory Control and Data Acquisition (SCADA), the USAT has proven to be an excellent choice for higher rate applications including broadcast video, full duplex video conferencing, remote telemedicine, ISDN voice and video communication, high speed data transfers (receive mode), Internet access from remote locations, and others. Demonstrations of these point-to-point applications conducted by NASA with various organizations have used data rates from 76 kbps up to 8 Mbps. This report summarizes the current architecture used by the USAT and describes several applications using the terminal.
Author
Systems Engineering; ACTS; Space Communication; Telecommunication; High Gain; Ground Stations; Power Amplifiers; Frequency Converters; Up-Converters; Apertures; Down-Converters

19980024342 NASA, Washington, DC USA, International Academy of Astronautics, Paris, France, Universities Space Research Association, Houston, TX USA
Clinical and Educational Support for Space Flight via Telemedicine
12th Man in Space Symposium: The Future of Humans in Space. Abstract Volume; 1997, 21-27; In English; No Copyright; Avail: CASI; A02, Hardcopy

Session MP3 includes short reports on: (1) Telemedicine: A User's Perspective; (2) Health Care in Extreme Environments; (3) Integration of Emerging Technologies in Information and Telecommunications in Health Care Systems for Space; (4) Telemedicine and Environmental Medicine in Russia: A First Step in Basic Medical Education; and (5) Clinical Utility of Internet Telemedicine.
CASI
Telemedicine; Aerospace Medicine; Health; Spacecraft Environments

19980024339 NASA, Washington, DC USA, International Academy of Astronautics, Paris, France, Universities Space Research Association, Houston, TX USA

12th Man in Space Symposium: The Future of Humans in Space. Abstract Volume

12th Man in Space Symposium; The Future of Humans in Space; 1997; In English; 12th Man in Space Symposium: The Future of Humans in Space, 8-13 Jun. 1997, Washington, DC, USA

Contract(s)/Grant(s): NCC9-41

Report No.(s): NASA/TM-97-207601; NAS 1.15:207601; No Copyright; Avail: CASI; A16, Hardcopy

The National Aeronautics and Space Administration (NASA) is pleased to host the 12th IAA Man in Space Symposium. A truly international forum, this symposium brings together scientists, engineers, and managers interested in all aspects of human space flight to share the most recent research results and space agency planning related to the future of humans in space. As we look out at the universe from our own uniquely human perspective, we see a world that we affect at the same time that it affects us. Our tomorrows are highlighted by the possibilities generated by our knowledge, our drive, and our dreams. This symposium will examine our future in space from the springboard of our achievements.

Author

Conferences; Manned Space Flight; Life Sciences; Gravitational Effects; Microgravity; Physiological Effects; Biological Effects; Aerospace Medicine; Aerospace Environments

19980024359 NASA, Washington, DC USA, International Academy of Astronautics, Paris, France, Universities Space Research Association, Houston, TX USA

Technology, Part 2

12th Man in Space Symposium: The Future of Humans in Space. Abstract Volume; 1997, 177-188; In English; No Copyright; Avail: CASI; A03, Hardcopy

In this session, Session WP3, the discussion focuses on the following topics: Monitoring Physiological Variables With Membrane Probes; Real Time Confocal Laser Scanning Microscopy, Potential Applications in Space Medicine and Cell Biology; Optimum Versus Universal Planetary and Interplanetary Habitats; Application of Remote Sensing and Geographic Information System Technologies to the Prevention of Diarrheal Diseases in Nigeria; A Small G Loading Human Centrifuge for Space Station ERA; Use of the Bicycle Ergometer on the International Space Station and Its Influence On The Microgravity Environment; Munich Space Chair (MSC) - A Next Generation Body Restraint System for Astronauts; and Thermoelectric Human-Body Cooling Units Used By NASA Space Shuttle Astronauts.

CASI

Aerospace Medicine; Biological Effects; Bioastronautics; Physiological Effects; Manned Space Flight; Astronauts; Spaceborne Experiments; Gravitational Physiology

20020040846 NASA Ames Research Center, Moffett Field, CA USA

Perceptual Image Compression in Telemedicine

Watson, Andrew B.; Ahumada, Albert J., Jr.; Eckstein, Miguel; Null, Cynthia H., Technical Monitor; [1996]; In English; Technology 2006, Telemedicine Workshop, 29-31 Oct. 1996

Contract(s)/Grant(s): RTOP 199-06-12; No Copyright; Avail: Other Sources; Abstract Only

The next era of space exploration, especially the 'Mission to Planet Earth' will generate immense quantities of image data. For example, the Earth Observing System (EOS) is expected to generate in excess of one terabyte/day. NASA confronts a major technical challenge in managing this great flow of imagery: in collection, pre-processing, transmission to earth, archiving, and distribution to scientists at remote locations. Expected requirements in most of these areas clearly exceed current technology. Part of the solution to this problem lies in efficient image compression techniques. For much of this imagery, the ultimate consumer is the human eye. In this case image compression should be designed to match the visual capacities of the human observer. We have developed three techniques for optimizing image compression for the human viewer. The first consists of a formula, developed jointly with IBM and based on psychophysical measurements, that computes a DCT quantization matrix for any specified combination of viewing distance, display resolution, and display brightness. This DCT quantization matrix is used in most recent standards for digital image compression (JPEG, MPEG, CCITT H.261). The second technique optimizes the DCT quantization matrix for each individual image, based on the contents of the image. This is accomplished by means of a model of visual sensitivity to compression artifacts. The third technique extends the first two techniques to the realm of wavelet compression. Together these two techniques will allow systematic perceptual optimization of image compression in NASA imaging systems. Many of the image management challenges faced by NASA are mirrored in the field of telemedicine. Here too there are severe demands for transmission and archiving of large image databases, and the imagery is ultimately used primarily by human observers, such as radiologists. In this presentation I will describe some

of our preliminary explorations of the applications of our technology to the special problems of telemedicine.
Author
Video Compression; Imagery; Telemedicine; Imaging Techniques; Space Exploration

19970007731 Deutsche Forschungsanstalt fuer Luft- und Raumfahrt, Cologne, Germany
DLR, Institute of Aerospace Medicine
Aug. 1995; In English
Report No.(s): DLR-IB-316-95-01; No Copyright; Avail: Other Sources

The present report of the Institute of Aerospace Medicine at DLR, Cologne, summarizes the achievements reached during 1994 and the plans for 1995 and beyond. The scientific and operational work of the Institute focuses on human factors research, on molecular medicine, and on teleoperations. These three main strengths of the work of the Institute are substantiated by multiple collaborations within the Institute, within DLR, and by numerous national and international collaborative efforts. While work in aviation and space medicine remains the center of the work of the Institute, applications of the results in other fields are part of the institute strategy. Examples of technology transfer are applications of technology that has been developed for space medicine in the newly emerging field of telemedicine, applications of methods for psychological testing of pilots in testing of drug safety or applications of microbiosensors developed for determination of radiation effects in space for personal UV monitoring on Earth. Growing external funding of research and development projects by national and international public agencies and research organizations as well as by industry has made it possible to keep the employment rate at the Institute constant at over 100 employees despite a reduction of the in-house personnel from 76 employees in 1992 to 61 employees in 1995. These achievements were only possible by the intensive engagement of the highly motivated institute staff. For 1995 and beyond, further increases in external funding will enable the Institute to accept the challenge to apply findings and technology from aviation and space medicine to other fields of medicine and to increase the interaction between the different disciplines. For this purpose, the Institute has developed (1) a telemedicine program, (2) a microbiotechnology program and has remodelled several laboratories into molecular biology labs, and (3) developed a program to conduct clinical studies both with healthy subjects and with patients.
FIZ
Aerospace Medicine; Research Projects; Budgeting; Personnel Development; Bibliographies

19950027636 Department of the Air Force, Brooks AFB, TX, USA
New advances in physiological measurements during high-G: Technology
Balldin, Ulf I.; AGARD, Current Concepts on G-Protection Research and Development; May 1, 1995, 10 p; In English; Copyright; Avail: CASI; A02, Hardcopy

New noninvasive techniques for measuring cardiovascular parameters have been introduced to the acceleration research in centrifuge and in flight in fighter aircraft. Transcranial Doppler blood flow velocity measurements have been used in the centrifuge to detect brain blood flow changes during high G. As probe movements during high G is a problem, a remote control probe system has been developed and tested for better accuracy. Infrared spectrophotometry has been tested during increased G, but further development is required. Ear opacity blood volume measurements of circulatory endpoints during high G has been re-introduced. The use of Finapres or similar equipment to measure finger blood pressure has shown to be a very effective tool in acceleration research, both in the centrifuge and in flight, when used properly. Impedance plethysmography has also shown to be a useful tool in acceleration research. Doppler ultrasound blood flow measurements and echocardiography are difficult to use at high G-level, if new robotic techniques are not developed. Subjective scales for ratings of perceived exertion during testing of G-protecting measures or during centrifuge fatigue studies seem to be valuable tools in acceleration research and may help to avoid the need for maximal tests in the centrifuge and thereby discomfort and injuries.
Author
Aerospace Medicine; Bioinstrumentation; Blood Flow; Blood Pressure; Blood Volume; Cardiac Output; Flow Measurement; Nonintrusive Measurement; Physiological Tests; Pressure Measurement; Velocity Measurement

19970019639 Georgia Inst. of Tech., Atlanta, GA USA
A Robust Model-Based Coding Technique for Ultrasound Video
Docef, Alen; Smith, Mark J. T.; Mar. 1995; In English
Contract(s)/Grant(s): NSF MIP-91-16113
Report No.(s): NASA-CR-204472; NAS 1.26:204472; No Copyright; Avail: CASI; A03, Hardcopy

This paper introduces a new approach to coding ultrasound video, the intended application being very low bit rate coding

for transmission over low cost phone lines. The method exploits both the characteristic noise and the quasi-periodic nature of the signal. Data compression ratios between 250:1 and 1000:1 are shown to be possible, which is sufficient for transmission over ISDN and conventional phone lines. Preliminary results show this approach to be promising for remote ultrasound examinations.
Author
Telemedicine; Coding; Data Compression; Ultrasonics; Compression Ratio

20020033032 NASA Ames Research Center, Moffett Field, CA USA
Sensor Systems for Space Life Sciences
Somps, Chris J.; Hines, John W.; Connolly, John P., Technical Monitor; [1995]; In English; Advanced Technology Applications to Combat Casualty Care Workshop, 17-18 May 1995, Silver Spring, MD, USA
Contract(s)/Grant(s): RTOP 106-20-08-01; No Copyright; Avail: Other Sources; Abstract Only

Sensors 2000! (S2K!) is a NASA Ames Research Center engineering initiative designed to provide biosensor and bio-instrumentation systems technology expertise to NASA's life sciences spaceflight programs. S2K! covers the full spectrum of sensor technology applications, ranging from spaceflight hardware design and fabrication to advanced technology development, transfer and commercialization. S2K! is currently developing sensor systems for space biomedical applications on BION (a Russian biosatellite focused on Rhesus Monkey physiology) and NEUROLAB (a Space Shuttle flight devoted to neuroscience). It's Advanced Technology Development-Biosensors (ATD-B) project focuses efforts in five principle areas: biotelemetry Systems, chemical and biological sensors, physiological sensors, advanced instrumentation architectures, and data and information management. Technologies already developed and tested included, application-specific sensors, preamplifier hybrids, modular programmable signal conditioners, power conditioning and distribution systems, and a fully implantable dual channel biotelemeter. Systems currently under development include a portable receiver system compatible with an off-the-shelf analog biotelemeter, a 4 channel digital biotelemetry system which monitors pH, a multichannel, g-processor based PCM biotelemetry system, and hand-held personal monitoring systems. S2K! technology easily lends itself to telescience and telemedicine applications as a front-end measurement and data acquisition device, suitable for obtaining and configuring physiological information, and processing that information under control from a remote location.
Author
Fabrication; Life Sciences; Sensors; Aerospace Medicine; Biotelemetry; Space Flight

19950011683 Naval Postgraduate School, Monterey, CA, USA
The current status of Russian/CIS communication satellites
Ninas, Larry E.; Sep 1, 1994; In English
Report No.(s): AD-A285526; No Copyright; Avail: CASI; A05, Hardcopy

As part of a Memorandum of Understanding (MOU) signed by U.S. President George Bush and Russian President Mikhail Gorbackev during a July 1991 summit meeting, the U.S. agreed to expand civil space cooperation with the Russian Federation and the Commonwealth of Independent States (CIS). The goal of the MOU was to increase the technical capabilities of both sides to respond to both natural and man-made disasters and top benefit from the capabilities and involvement of international and non-government organizations. This summit agreement has allowed the Russian Federation to offer unprecedented commercial and emergency relief access to their on-orbit communications satellites. This thesis presents a brief history of the Soviet/Russian communication satellite program, and an examination of current systems as well as future and on-order systems. Simulations were conducted to determine the useability of the major systems (Gorizont, Ekran, Molniya, and Raduga) from 17 geographic locations. This is concluded with an introduction to the Telemedicine Space-bridge Project that is a direct result of the Bush-Gorbachev summit, and a shining example of Russian/U.S. cooperation in the satellite communication arena.
DTIC
Commonwealth of Independent States; Communication Satellites; Computerized Simulation; Russian Federation; Satellite Communication

19950019811 Bertin et Cie., Aix-les-Milles, France
Short presentation of a case study: Space ambulatory recorder and health care telemedicine
Weber, J. L.; ESA, Technology Transfer Workshop, Proceedings; Aug 1, 1994, p 121-126; In English; Copyright; Avail: CASI; A02, Hardcopy; US Distribution and Sales Only

The Kymo system, an integrated qualified spaceborne system designed to measure physiological data, is described. This

equipment was used on the Mir Space Station in Oct. 1991 for the AustroMir mission. The integrated measurement system consists of a hand-held computer, a sensor jacket which supports fixation of the sensors on the human body surface, and a hand dynamometer for isometric tests. It was developed for biomedical microgravity experiments on the Soviet Mir Space Station. Data are received each month by telemetric data transfer from the space station. The purpose of the Kymo system is to study muscle tremor mechanisms under microgravity conditions. The effect of weightlessness is to neutralize the antigravity component of the extensor muscles of the locomotor apparatus. Analysis of the residual tonicity of the muscle together with tremors produced is performed during isostatic effort conditions. Muscle tremors are recorded by accelerometers located on an ergometric grip. The major applications of the device and a market analysis are discussed.
ESA
Aerospace Technology Transfer; Biotelemetry; Body Measurement (Biology); Data Recorders; Market Research; Product Development; Technology Utilization

19950004150 NASA Lewis Research Center, Cleveland, OH, USA
Telemedicine Spacebridge
May 1, 1994; In English
Report No.(s): LERC-255; NASA-TM-109923; NONP-NASA-VT-94-23165; No Copyright; Avail: CASI; B01, Videotape-Beta; V01, Videotape-VHS

This video is an overview on NASA's Telemedicine Spacebridge Project, which lets US doctors consult with Russian clinicians thousands of miles away by demonstration of the feasibility of live, two-way, full-bandwidth video as a medical tool.
LeRC
Clinical Medicine; International Cooperation; Medical Electronics; Medical Equipment; Medical Services; Teleconferencing; Video Communication; Video Equipment

19940022924 NASA Lewis Research Center, Cleveland, OH, USA
The telemedicine spacebridge project: A joint US/Russian venture in long distance medicine via satellite
Zuzek, John E.; Cauley, Michael A.; Hollansworth, James E.; Mar 1, 1994; In English; 15th, 28 Feb. - 3 Mar. 1994, San Diego, CA, USA
Contract(s)/Grant(s): RTOP 106-70-00
Report No.(s): NASA-TM-106523; E-8646; NAS 1.15:106523; AIAA PAPER 94-1119; No Copyright; Avail: CASI; A03, Hardcopy

The Telemedicine Spacebridge Demonstration Project is a joint U.S./Russian program whose purpose is to further the application of telemedicine both internationally, domestically, and in space. The system has been set up to use a Russian satellite over the Atlantic Ocean and a U.S. domestic satellite to allow physicians a two-way video and audio link between various sites of medical centers in the USA and the Central Hospital in Moscow, Russia. This paper contains a description of the project background, the Spacebridge system, the individual pieces of the system, and the operational experience gained thus far in the project.
Author (revised)
International Cooperation; Medical Services; Satellite Communication; Video Communication

19940029513 NASA Johnson Space Center, Houston, TX, USA
Seventh Annual Workshop on Space Operations Applications and Research (SOAR 1993), volume 1
Krishen, Kumar, editor; Jan 1, 1994; In English, 3-5 Aug. 1993, Houston, TX, USA; See also N94-34020 through N94-34062
Report No.(s): NASA-CP-3240-VOL-1; S-749-VOL-1; NAS 1.55:3240-VOL-1; No Copyright; Avail: CASI; A21, Hardcopy

This document contains papers presented at the Space Operations, Applications and Research Symposium (SOAR) Symposium hosted by NASA/Johnson Space Center (JSC) on August 3-5, 1993, and held at JSC Gilruth Recreation Center. SOAR included NASA and USAF programmatic overview, plenary session, panel discussions, panel sessions, and exhibits. It invited technical papers in support of U.S. Army, U.S. Navy, Department of Energy, NASA, and USAF programs in the following areas: robotics and telepresence, automation and intelligent systems, human factors, life support, and space maintenance and servicing. SOAR was concerned with Government-sponsored research and development relevant to aerospace operations. More than 100 technical papers, 17 exhibits, a plenary session, several panel discussions, and several keynote speeches were included in SOAR '93.
Aerospace Medicine; Artificial Intelligence; Conferences; Life Support Systems; Man Machine Systems; Psychophysiology; Robotics; Space Maintenance

20020014367 NASA Ames Research Center, Moffett Field, CA USA

A Spacelab Expert System for Remote Engineering and Science

Groleau, Nick; Colombano, Silvano; Friedland, Peter, Technical Monitor; [1994]; In English; 1995 AIAA/NASA Life Sciences and Space Medicine Conference, 3-6 Apr. 1995, Houston, TX, USA

Contract(s)/Grant(s): RTOP 233-02-07; No Copyright; Avail: Other Sources; Abstract Only

NASA's space science program is based on strictly pre-planned activities. This approach does not always result in the best science. We describe an existing computer system that enables space science to be conducted in a more reactive manner through advanced automation techniques that have recently been used in SLS-2 October 1993 space shuttle flight. Advanced computing techniques, usually developed in the field of Artificial Intelligence, allow large portions of the scientific investigator's knowledge to be 'packaged' in a portable computer to present advice to the astronaut operator. We strongly believe that this technology has wide applicability to other forms of remote science/engineering. In this brief article, we present the technology of remote science/engineering assistance as implemented for the SLS-2 space shuttle flight. We begin with a logical overview of the system (paying particular attention to the implementation details relevant to the use of the embedded knowledge for system reasoning), then describe its use and success in space, and conclude with ideas about possible earth uses of the technology in the life and medical sciences.

Author

Artificial Intelligence; Expert Systems; Spacelab; Space Shuttles; Aerospace Medicine

19940029135 Naval Air Warfare Center, China Lake, CA, USA

Telemedicine, virtual reality, and surgery

Mccormack, Percival D.; Charles, Steve; NASA. Johnson Space Center, Seventh Annual Workshop on Space Operations Applications and Research (SOAR 1993), Volume 2; Jan 1, 1994, p 509-521; In English; No Copyright; Abstract Only; Available from CASI only as part of the entire parent document

Two types of synthetic experience are covered: virtual reality (VR) and surgery, and telemedicine. The topics are presented in viewgraph form and include the following: geometric models; physiological sensors; surgical applications; virtual cadaver; VR surgical simulation; telesurgery; VR Surgical Trainer; abdominal surgery pilot study; advanced abdominal simulator; examples of telemedicine; and telemedicine spacebridge.

Derived from text

Abdomen; Aerospace Medicine; Computerized Simulation; Medical Services; Surgery; Teleoperators; Training Devices; Virtual Reality

Subject Terms

Corporate Sources

Document Authors