ORION

SUMMER 2003

Where stars are born.

ANALYSIS OF ROBOTICS TECHNOLOGY – UMBRA

ORION TEAS TEAM: JOINT STRIKE FIGHTER PROGRAM

Excellence in technology for a better future.

An ORION Publication

It is with genuine pleasure that I introduce our new quarterly publication entitled ORION…*Where Stars are Born*. The form and content of this publication reflect both our achievements and our ambitions for the future of our company. The constellation Orion is symbolic of us in several ways. Just as the Orion nebula is a place where stars are born, so is ORION a company where stars are born, and just as the light of the constellation is a composite of all within it, so is ORION a company whose achievements result from the success of all its employees.

The Orion constellation is the subject of powerful, ancient myths in many cultures of the world. In addition to these mythic truths, the Orion constellation provides scientific truths to those who study it. On a more modest scale, ORION International has been the site of much interesting and valuable R&D during the past eighteen years. But as we all know, no achievement is possible without the diligence and hard work of our staff, the stars of our success. In recognition of their efforts, we will focus on two to three key technology areas, starting with our July issue, showcasing the achievements of our employees and saluting the customers for whom we have done the work. We begin in this issue with articles highlighting our progress in Umbra code development and commercialization in support of the Intelligent Systems and Robotics Center (ISRC) of Sandia National Laboratories, and the Joint Strike Fighter (JSF) development for the Air Armament Center at Eglin Air Force Base (through our subcontract with Sverdrup Technology).

Dr. Michael Krause
Vice President of Strategic Planning and Development

To help us in our continuing adventure, I am happy to report that Dr. Michael Krause, who joined us in May, has taken the position of Vice President of Strategic Planning and Development. Mr. Fred Fare has joined us as our Vice President of Business Development and Ms. Juliette Salvati has joined us as our Manager of Business Development. All three are based in our East Coast Office.

I am genuinely enthused to be CEO of ORION as we continue to grow and evolve into a larger and brighter constellation.

Miguel Ríos, Jr., Ph.D.,
CEO of ORION

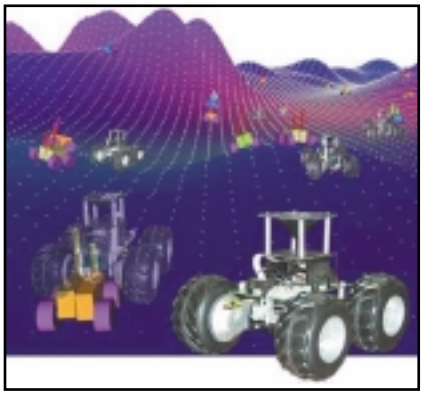
ORION AT SANDIA NATIONAL LABORATORIES

UMBRA MODELING AND SIMULATION FRAMEWORK

ORION is a systems development and integration partner with the Sandia National Laboratories (SNL) Intelligent Systems and Robotics Center (ISRC) and holds a commercialization license for Sandia-developed Umbra modeling and simulation framework. Under the license, ORION will develop and maintain the Umbra infrastructure and continually incorporate intellectual property into Umbra, establishing ORION as the sole source for the platform, taking Umbra to DoD and other federal government agencies as well as to the commercial market.

Umbra is a highly modular physics-based computational framework for interactive simulation. The Umbra core and modules are written in C++; VRML is used for graphics representations; and the Tcl/Tk script language is used to invoke the different Umbra facilities, controls, and modules. Because Umbra uses a modular architecture, incorporation of code modules is relatively simple; therefore, existing libraries of physics code can potentially be incorporated into Umbra as additional modules. Engineers and physicists will enjoy rapid spin up and productivity with Umbra.

Umbra programs for the SNL ISRC involving ORION staff include models of manipulators, adaptive platform cranes for moving cargo between ships in rough seas, unmanned ground vehicles (UGVs) and unmanned aerial vehicles (UAVs), military operations in urban terrain (MOUT), network centric battlespace, network guided missiles, cognitive systems, and defense demilitarization activities too hazardous for humans.



Umbra helps maximize ROI and contributes to lowering development cost by allowing the user to test products and systems during the design process, before production begins. Umbra also allows the simulation of activities too costly, too dangerous, or logistically improbable. The professionalism and expertise of the ORION team help make the ORION Umbra product a high quality, high result tool for the end-user.

Umbra is an outgrowth of a student intern project by ORION employee Eric Gottlieb. Eric created the foundation of Umbra for a project he was working on for SNL. The value of his program was so evident that he was then tasked with generalizing it into the framework that now exists. In early July 2003, a major piece of work, the Umbra User Manual, was completed, fulfilling a prime condition of our licensing agreement with SNL. The manual was the product of the close cooperation between ORION engineers Doug Dunbar, the primary author, and Robert Brittain, our most senior Umbra applications engineer, along with inputs from the SNL staff. The licensing and development of Umbra continues under the mentorship of ISRC's Dr. Ray Harrigan and Mr. Ray Shaum.

Recently, ORION supported Remotec/Northrop-Grumman (under contract with Boeing, the Lead System Integrator (LSI) for the Army Future Combat Systems (FCS) program) for UGV Modeling and Simulation. During the final program review and demonstration which included the entire FCS/UGV customer community (including Army and DARPA personnel), ORION was recognized for superior performance by Mr. John Larson, the Boeing/LSI manager for the Multifunction Utility/Logistics Equipment (MULE) and Armed Reconnaissance Vehicle (ARV). Mr. Larson described ORION's work as being "very impressive and demonstrative of the potential for such attributes as communication, sensors, weapon systems, controls, and federation at the higher levels for Battlelabs and the Virtual Proving Ground." He added that ORION's simulations were more complete and complex than any of the other UGV teams' – a testimony to ORION and the flexibility and adaptability of the Umbra architecture. ORION has been invited to join teams for the next FCS program phase.

Umbra has been used for the analysis of numerous complex systems with incorporated robotic concepts. Umbra offers valuable features such as:

- A highly modular simulation environment that facilitates rapid model building
- A High Level Architecture (HLA) interface library that utilizes the DMSO RTI NG1.3 software library to federate Umbra-based models into HLA environments
- An analysis of both mobile and manipulator robot concepts as well as the interaction of robotics and other automated systems
- Compatibility with digital terrain databases and other environmental models
- A large module library with modules for environments, sensors, communication, vehicle mobility, behavior and automated planning
- The ability to analyze communication stability, novel mobility concepts, mobile manipulation concepts, multi-sensor integration, etc.
- Dynamic instantiation and parameterization allowing systems to automatically adapt

Umbra allows users to analyze different aspects of systems, ranging from control to application compatibility. Umbra's architecture allows multiple models to simultaneously run on different, even heterogeneous, computing platforms. Both physics-based and semi-empirical models can be coupled to provide realistic analysis. Umbra allows physical devices, such as sensors, to be integrated with simulations in order to examine how real systems might perform in complex virtual environments. Operators and physical platforms can be connected to the Umbra environment for training. By allowing for user-defined modules, Umbra is - in theory - infinitely extensible.

ORION TEAS TEAM

ON THE FRONT LINES OF WEAPON DEVELOPMENT

ORION International Technologies is currently participating in the Joint Strike Fighter (JSF), F-35, Program through its involvement in the TEAS (Technical Engineering & Acquisition Support) team as a subcontractor to JE/Sverdrup Technology. ORION engineer Curtis Erickson is leading the JSF Weapons Engineering Support task. Kevin Gravois, Tom Wichers, and Ruth Hailey, also ORION engineers, provide technical support at Eglin AFB near Fort Walton Beach, Florida. These task members provide modeling and simulation support and JSF Gun System development support. The JSF program allows simulation to be used not only as a verification and testing tool, but also as a means to improve efficiency and dramatically reduce cost. Additionally, the program is developing an internal gun system for the JSF Air Force variant and an external gun system for the Navy and Marine variant.

The TEAS team is currently in the middle of year two of the System Design and Development (SDD) phase of the JSF program. They are working diligently in support of the JSF Program Office, Air Armament Center (AAC), Integrated Test Force, and Lockheed Martin in making their contribution toward the development of JSF, one of DOD's key weapons of the future. Eglin AFB is the lead for and supports JSF weapons systems integration, C4I, EW, mission planning, gun system, and store suspension integration, simulation, and test programs. Recently, the Deputy Program Officer, RADM Steve Enewold, recognized the TEAS team for their "outstanding support to the JSF program".

The JSF Program is the focal point of the U.S. Department of Defense for defining, developing, and delivering affordable, next-generation strike aircraft weapons systems. It will address the needs of U.S. Armed Services and other international partners by developing and deploying a family of strike fighter aircraft that maximizes affordability by capitalizing on commonality and modularity. This family of strike fighter aircraft consists of three variants: conventional takeoff and landing (CTOL), aircraft carrier suitable (CV), and short takeoff vertical landing (STOVL).

The TEAS team assists in planning and assessment of the onboard systems capabilities and on-board/off-board interfaces required for an integrated weapon, C4I, and mission planning capability, including the mechanical, electrical, environmental, logical, and human functions between the aircraft, operator, maintainers, off-board systems, and various stores. The team places strong emphasis on ensuring that all mission planning systems requirements are allocated to and available from JSF system components so that aircraft software and weapon architecture can evolve seamlessly through rapid reprogramming and the integration of new capabilities. The TEAS team is especially well suited to support the development of the JSF thanks to its highly diverse engineering staff, several of whom are nationally known experts. This provides numerous options for weapon system support to the JSF Program Office as all subsystems of weapons are supported by TEAS personnel. Consequently, the TEAS Contract is the "one-stop shop" source of quality weapon system engineering talent which allows the JSF Program Office to view the whole weapon integration effort with confidence, certain that the work will be accomplished with the highest degree of quality, in the most efficient manner, and at the lowest possible cost.

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FRED E. FARE

Named VP of Business Development

Fred E. Fare has been named ORION's Vice President of Business Development. He will be based in our East Coast Office. The main focus of Fred's job will be to formulate and maintain relationships with new clients and business partners and to guide new business growth. Fred joins ORION's business development team with a distinguished background in DoD and commercial Information Technology services, and engineering, management consulting and telecommunications services. He brings extensive experience in strategic planning, development and leadership of sophisticated, high-tech organizations.

About his new position with ORION Fred says, "I am pleased and proud to have joined the ORION Team. I am looking forward to building upon the company's core capabilities and past performance as a member and leader of the Business Development Team to develop new clients and partners and to help drive the growth of the business."

His previous experience includes senior management assignments at Cole & Fare; Gichner Shelter Systems; Radix Systems; ARINC Research; and the U.S. Navy (where he was the Commanding Officer of the USS George C. Marshall (SSBN654)). Fred is a graduate of Kansas University, where he received a BS in physics and a BA in mathematics, and is certified as an Engineering Management Specialist by the U.S. Navy.

JULIETTE H. SALVATI

Joins Business Development Team

Juliette H. Salvati has joined ORION's business development team. Juliette, a key member of our BD Team, will be located in our East Coast Office as the new Business Development Manager. Her duties will include competitive intelligence, business research analysis, marketing, and proposal team direction and coordination. Juliette reports to and supports the Vice President of Business Development with client relations and business growth efforts.

Juliette has an extensive background in business development and marketing with the private sector and the federal government. As Program Leader of Frost and Sullivan's Satellite Communications group, Juliette participated in large research and forecast projects and helped increase the group's revenues by expanding the client base, increasing name recognition and diversifying the group's activities.

Fluent in French, Spanish and English, Juliette previously served as an international technology policy analyst for Futron Corporation's Space and Telecommunications Industry Analysis Division. Prior to this, Juliette worked as an analyst at Aries Analytics and the Space Policy Institute in Washington, DC.

Juliette is a Phi Beta Kappa graduate of The Catholic University of America (BA 1992) and the Universite de Toulon et du Var (MA,1995)

ORION TEAS TEAM
ON THE FRONT LINES OF WEAPON DEVELOPMENT
(Continued)

Key contributions of the TEAS team are:

- Collection of Weapons Data Support information
- Engineering and analysis support for the planning of test activities
- Support to the AAC/WM and JSFPO efforts to plan and implement weapon simulation capabilities and interfaces
- Weapon modeling simulation
- Assistance in acquisition logistics engineering
- Assistance in defining the JSF weapons loadout, interfaces, and test requirements

The ORION TEAS team provides the requirements and procedures, and makes recommendations for joint testing to accomplish weapon test/certification on tactical aircraft. Team members identify and compile program costs, then schedule and test asset requirements that support a typical weapon certification program. TEAS Team Members cumulate many years of experience in the integration, simulation, and testing of weapon systems, electronic combat systems, C4I, mission planning systems, gun and ammunition systems, and stores suspension and release equipment.

JSF is a Simulation Based Acquisition Program which means that simulation will be used as a tool to improve development efficiency and dramatically cut test costs. Additionally, ORION personnel have played a key role in the development of the JSF Gun System, which has led to the savings of thousands of program dollars and to the selection of a system based on sound engineering analyses and judgment.

As an indication of the quality and performance of the TEAS team, the Air Force recently exercised all three of its one-year extension options on the contract. This action extends the period of performance of the TEAS IV Contract through June 2006.

CONTRACT WINS

BITS II allows federal agencies including the FAA to order a vast array of services, including IT, telecommunications, systems engineering and design, software development, system procurement and life-cycle management, risk assessment and disaster and contingency planning, emerging technologies and security services, from ORION

TEAS IV three one-year options were exercised by the Air Force to extend the current contract under which ORION supports several Eglin AFB weapons programs, including the Joint Strike Fighter, F-35, Program

New Mexico Department of Education for Accountability Data System database maintenance

State of New Mexico for full life-cycle information technology (IT) services

The New Mexico Health Insurance Alliance for PowerBuilder system support

Albuquerque Public Schools to install, train and maintain programs used for validation and reporting from the Accountability Data System database

Photo source:
European Southern Observatory (ESO)

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