



## Books & Reports

### **Orbiter Interface Unit and Early Communication System**

A report describes the Orbiter Interface Unit (OIU) and the Early Communication System (ECOMM), which are systems of electronic hardware and software that serve as the primary communication links for the International Space Station (ISS). When a space shuttle is at or near the ISS during assembly and resupply missions, the OIU sends ground- or crew-initiated commands from the space shuttle to the ISS and relays telemetry from the ISS to the space shuttle's payload data systems. The shuttle then forwards the telemetry to the ground. In the absence of a space shuttle, the ECOMM handles communications between the ISS and Johnson Space Center via the Tracking and Data Relay Satellite System (TDRSS). Innovative features described in the report include (1) a "smart" data-buffering algorithm that helps to preserve synchronization (and thereby minimize loss) of telemetric data between the OIU and the space-shuttle payload data interleaver; (2) an ECOMM antenna-autotracking algorithm that selects whichever of two phased-array antennas gives the best TDRSS signal and electronically steers that antenna to track the TDRSS source; and (3) an ECOMM radiation-latchup controller, which detects an abrupt increase in current indicative of radiation-induced latchup and temporarily turns off power to clear the latchup, restoring power after the charge dissipates.

*This work was done by Ronald M. Cobbs, Michael P. Cooke, Gary L. Cox, Richard Ellenberger, Patrick W. Fink, Dena S. Haynes, Buddy Hyams, Robert Y. Ling, Helen M. Neighbors, Chau T. Phan, Kelly M. Prender-*

*gast, James D. Siekierski, Randall S. Wade, George A. Weisskopf, Hester J. Yim, Antha A. Adkins, James R. Carl, Y. C. Loh, Charles Roberts, Douglas J. Steel, Buveneka Kanishka DeSilva, Harold B. Killenb, and Robert M. Williams of Johnson Space Center. For further information, contact the Johnson Commercial Technology Office at (281) 483-3809. MSC-23225*

### **White-Light Nulling Interferometers for Detecting Planets**

A report proposes the development of a white-light nulling interferometer to be used in conjunction with a single-aperture astronomical telescope that would be operated in outer space. When such a telescope is aimed at a given star, the interferometer would suppress the light of that star while passing enough light from planets (if any) orbiting the star, to enable imaging or spectroscopic examination of the planets. In a nulling interferometer, according to the proposal, scattered light would be suppressed by spatial filtering in an array of single-mode optical fibers rather than by requiring optical surfaces to be accurate within 1/4,000 wavelength as in a coronagraph or an apodized telescope. As a result, angstrom-level precision would be needed in only the small nulling combiner, and not in large, meter-sized optics. The nulling interferometer could work as an independent instrument in space or in conjunction with a coronagraphic system to detect planets outside our solar system.

*This work was done by Bertrand Menneson, Eugene Serabyn, Michael Shao, and*

*Bruce Levine of Caltech for NASA's Jet Propulsion Laboratory. Further information is contained in a TSP (see page 1). NPO-30547*

### **Development of Methodology for Programming Autonomous Agents**

A brief report discusses the rationale for, and the development of, a methodology for generating computer code for autonomous-agent-based systems. The methodology is characterized as enabling an increase in the reusability of the generated code among and within such systems, thereby making it possible to reduce the time and cost of development of the systems. The methodology is also characterized as enabling reduction of the incidence of those software errors that are attributable to the human failure to anticipate distributed behaviors caused by the software. A major conceptual problem said to be addressed in the development of the methodology was that of how to efficiently describe the interfaces between several layers of agent composition by use of a language that is both familiar to engineers and descriptive enough to describe such interfaces unambivalently.

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