sample rate, the data acquired was 7.1GB per 24 hours.

The PAMS is subsequently retrieved and its recorded data are downloaded to a computer, which can be used to either process the data or record the data on a disk for transfer to another computer for processing. The PAMS can then be prepared for another deployment.

This work was done by Michael Lane and Steven Van Meter of Kennedy Space Center; Richard Grant Gilmore, Jr., of Estuarine, Coastal and Ocean Science, Inc.; and Keith Sommer of the United States Air Force. For further information, contact the Kennedy Innovative Partnerships Office at (321) 861-7158. KSC-12634.

Wireless Data-Acquisition System for Testing Rocket Engines

Time-consuming, error-prone wiring tasks are eliminated.

Stennis Space Center, Mississippi

A prototype wireless data-acquisition system has been developed as a potential replacement for a wired data-acquisition system heretofore used in testing rocket engines. The traditional use of wires to connect sensors, signal-conditioning circuits, and data acquisition circuitry is time-consuming and prone to error, especially when, as is often the case, many sensors are used in a test.

The system includes one master and multiple slave nodes. The master node communicates with a computer via an Ethernet connection. The slave nodes are powered by rechargeable batteries and are packaged in weatherproof enclosures. The master unit and each of the slave units are equipped with a time-modulated ultra-wide-band (TM-UWB) radio transceiver, which spreads its RF energy over several gigahertz by transmitting extremely low-power and super-narrow pulses. In this prototype system, each slave node can be connected to as many as six sensors: two sensors can be connected directly to analog-to-digital converters (ADCs) in the slave node and four sensors can be connected indirectly to the ADCs via signal conditioners. The maximum sampling rate for streaming data from any given sensor is about 5 kHz. The bandwidth of one channel of the TM-UWB radio communication system is sufficient to accommodate streaming of data from five slave nodes when they are fully loaded with data collected through all possible sensor connections. TM-UWB radios have a much higher spatial capacity than traditional sinusoidal wave-based radios. Hence, this TM-UWB wireless data-acquisition can be scaled to cover denser sensor setups for rocket engine test stands. Another advantage of TM-UWB radios is that it will not interfere with existing wireless transmission.

The maximum radio-communication range between the master node and a slave node for this prototype system is about 50 ft (15 m) when the master and slave transceivers are equipped with small dipole antennas. The range can be increased by changing to larger antennas and/or greater transmission power. The battery life of a slave node ranges from about six hours during operation at full capacity to as long as three days when the system is in a "sleep" mode used to conserve battery charge during times between setup and rocket-engine testing. Batteries can be added to prolong operational lifetimes. The radio transceiver dominates the power consumption.

The software running in the computer enables users to do any or all of the following:

- Remotely controls the sleeping/awakening schedule of the slave nodes.
- Manage the sampling rates and latencies of readings of specific sensors to satisfy specific requirements and maximize utilization of the system.
- Synchronize the operations of all nodes.

This work was done by Chujen Lin, Ben Lonske, Yalin Hou, Yingjiu Xu, and Mei Gang of Intelligent Automation, Inc. for Stennis Space Center.

Inquiries concerning rights for the commercial use of this invention should be addressed to:

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Refer to SSC-00231, volume and number of this NASA Tech Briefs *issue, and the page number.*

Processing Raw HST Data With Up-to-Date Calibration Data

Goddard Space Flight Center, Greenbelt, Maryland

On-the-Fly Reprocessing (OTFR) is a collection of data-processing routines that work within the context of the Hubble Space Telescope (HST) pipeline data-flow system. The purpose served by OTFR is to generate, on demand, scientifically useful data products from raw HST data stored in an archive. First, on the basis of the requested final data products, OTFR retrieves the corresponding sets of raw data from the archives. Next, OTFR processes the raw data sets to remove artifacts and to establish proper header and other template information. Finally, the calibration routines appropriate to the specific data sets are invoked to produce the requested data products, and the data products are released to an archive distribution system for transmission to the requesting party. OTFR offers two notable advantages: (1) Inasmuch as calibrated data occupy about 8 times as much storage space as do raw data, by obviating storage of calibrated data, OTFR reduces the storage capacity needed by the archive; and (2) the calibration routines can be updated to give requesters the benefit of the most recent calibrations.

This work was done by Warren Miller of Space Telescope Science Institute for Goddard Space Flight Center. Further information is contained in a TSP (see page 1).