

1-1-1975

Satellite On-Board Processing of Earth Resources Data

Paul Wintz

Robert Rochelle

Robert Bodenheimer

Ralph Gonzalez

Follow this and additional works at: http://docs.lib.purdue.edu/lars_symp

Wintz, Paul; Rochelle, Robert; Bodenheimer, Robert; and Gonzalez, Ralph, "Satellite On-Board Processing of Earth Resources Data" (1975). *LARS Symposia*. Paper 89.

http://docs.lib.purdue.edu/lars_symp/89

This document has been made available through Purdue e-Pubs, a service of the Purdue University Libraries. Please contact epubs@purdue.edu for additional information.

Reprinted from

Symposium on

Machine Processing of

Remotely Sensed Data

June 3 - 5, 1975

The Laboratory for Applications of
Remote Sensing

Purdue University
West Lafayette
Indiana

IEEE Catalog No.
75CH1009-0 -C

Copyright © 1975 IEEE
The Institute of Electrical and Electronics Engineers, Inc.

Copyright © 2004 IEEE. This material is provided with permission of the IEEE. Such permission of the IEEE does not in any way imply IEEE endorsement of any of the products or services of the Purdue Research Foundation/University. Internal or personal use of this material is permitted. However, permission to reprint/republish this material for advertising or promotional purposes or for creating new collective works for resale or redistribution must be obtained from the IEEE by writing to pubs-permissions@ieee.org.

By choosing to view this document, you agree to all provisions of the copyright laws protecting it.

SATELLITE ON-BOARD PROCESSING OF EARTH
RESOURCES DATA

Paul Wintz, Robert Rochelle,
Robert Bodenheimer and Ralph Gonzalez

Purdue University, West Lafayette, Indiana,
University of Tennessee, Knoxville, TN.,
University of Tennessee, Knoxville, TN.,
and University of Tennessee, Knoxville, TN.

ABSTRACT

Earth resources data processing is presently in a research phase. Scientific spacecraft collect data and telemeter it to ground stations for processing. It is becoming apparent that significant amounts of useful information can be extracted from the multispectral scanner images by ERTS-1.

It appears that in the 1980-1990 decade operational spacecraft will be launched to continuously monitor crop production, severe weather systems, earth and water pollutants, etc., in order to provide operational information to the users of this information on a near-real time basis. It appears that it may be more cost effective to process the data on-board the satellite and transmit the results directly to the users of the information as opposed to transmitting down the raw data, processing it on the ground, and then disseminating the results via another satellite system.

In this paper we consider the feasibility of processing earth resources data on-board the satellite. We first determine some likely user application areas and from these the required data processing algorithms. These algorithms are then analyzed with respect to the computational load they impose on the on-board data processor. The on-board processor must also be matched to the format of the data as it is produced by the imaging system. Given the data input format constraints and the computational requirements required by the algorithms we investigate some computer architectures for the on-board processor. Since the multispectral scanner produces parallel data streams with high data rates and because of the many computations required by the algorithms some sort of multiprocessor organization seems appropriate.

INTERFACING OF A COLOR-TV-MONITOR AND A
PROCESSOR WITH THE AID OF AN EXTERNAL
CORE-MEMORY FOR INTERACTIVE PICTURE
PROCESSING.

SYMPOSIUM ON "MACHINE PROCESSING OF
REMOTELY SENSED DATA"

R. Buecklein, E. Krauth, M. Mozer
and R. Stoiber

Deutsche Forschungs- und Versuchsanstalt
für Luft- und Raumfahrt e.V.

Institut für Satellitenelektronik
8031 Oberpfaffenhofen, West-Germany

ABSTRACT

An interactive picture processing system was developed for semi-automatic processing of the NOAA-3-type weather satellites picture data. This can be helpful in cases where the experiences and the knowledge of the meteorologists can support the digital data processing. Also the system serves as a quick-look image display.

A precision color-TV monitor is used with a 19-inch screen, operating according to the TV-standards. This monitor receives the picture data from a core-memory which is the interface to a PDP 11/45 digital data-processor. The separate core-memory comprises 163 840 18-bit-locations and is organized as a random access memory with respect to a maximum flexibility. The capacity of the memory was chosen to be sufficient for operating in a section of the screen where the distortions are negligible. The core-memory is used as a quick image-refreshing memory as well as a buffer equalizing the highly from each other differing transfer rates by transferring data from the processor to the memory and from the memory to the TV-monitor. A TV-camera is coupled with the core-memory to enable the operator to put additional informations on the screen or to feed this information to the processor. By using a light-dot receiver, the operator can pick up co-ordinate values from the monitor screen to be transferred to the core-memory or to the processor. Also marking signals can be transferred to the screen as well by hand as by a mini computer.