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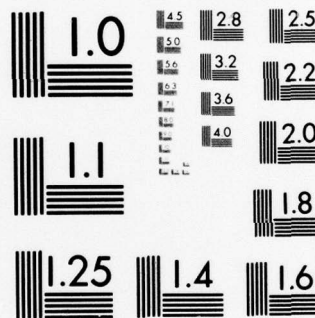
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20. Abstract continued.

cont. state new stronger lower bounds for the filtering error are derived.

> In the area of building nonlinear filter the estimate production speed of the two dimensional phase demodulation problem on the Cray 1 is being improved by examining the assembly code generated by the Cray 1 compiler and seeking to improve the running time by changing the Fortran code on the basis of these observations. This latter problem has been extensively investigated on the CDC 7600 and the Star 100, which in fact has lead to increased understanding of some of the architectural design constraints inherent in the use of these machines on problems requiring large memories (i.e. over 200K decimal).

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September 30, 1977 - September 29, 1978

Richard S. Bucy
Principal Investigator

Personnel Supported

During the year the following people were supported: Technical Typist, Ilse Allott; Graduate Students, Faramarz Ghovanlou and Thomas Bleakney; Secretaries, Virginia Wright and Alice Vaughn; and Principle Investigator R. S. Bucy.

Research Summary

In the area of finding performance bounds on the nonlinear filtering problem, we have recently (2) evaluated the information rate between the signal at time t and the observation process up to time t for the general discrete time nonlinear filtering problem. This information rate allows a general definition of steady state (i.e. when it vanishes) for the general nonlinear filtering problem. Further in steady state new stronger lower bounds for the filtering error are derived. In the special case of (1) stronger results are generated.

In the area of building nonlinear filters, we are currently seeking to improve the estimate production speed of the two dimensional phase demodulation problem on the Cray 1 by examining the assembly code generated by the Cray 1 compiler and seeking to improve the running time by changing the Fortran code on the basis of these observations. We would like to look at the combined phase amplitude problem on the Cray, but lack computer time at present.

This latter problem has been extensively investigated on the 7600 and the Star 100, which in fact has lead to increased understanding of some of the architectural design constraints inherent in the use of these machines on problems requiring large memory requirements (i.e. over 200 K decimal). These results are reported in (1) and (3).

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Papers Appearing

- (1) R. S. Bucy, J. Pages "A Priori Bounds for the Cubic Sensor Problem", IEEE Trans on Automatic Control, Vol. AC-23, 1, 1978, 88-91.
- (2) R. S. Bucy "Nonlinear Filtering with Pipeline and Array Processors", Proceeding Conference on Decision and Control, Dec., 1977, F-9 626-629.

Papers Submitted

- (1) R. S. Bucy, K. D. Senne "New Frontiers in Nonlinear Filtering", M.I.T. Lincoln Lab. Technical Note, 1978-16, 1-54, submitted IEEE Trans on Automatic Control.
- (2) R. S. Bucy "Information and Filtering", submitted Information Sciences.
- (3) R. S. Bucy, K. D. Senne "Computational Frontiers in Nonlinear Filtering, to appear, Proceeding Conference on Decision and Control, San Diego, 1978.

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