EDITORIAL

"Gallimaufry" is a word derived from Middle French referring to a ragout or hash. The dictionary defines its current meaning as medley, mixture, hodgepodge, or jumble. To a French cook, medley or mixture might be acceptable, but the other terms most assuredly do not refer to a properly put together ragout. The technical programs at the Applied Physics Laboratory derive mainly from DoD requirements, but we believe they present more than a loose mixture of different technologies and disciplines. In fact, they properly form a medley, an intellectual ragout, if you will, with identifiably different tastes and textures producing in the whole a pleasing and nourishing combination.

At any rate this is a gallimaufry issue, we hope with a proper blend of ingredients, to provide a medley of taste for its readers. Throughout our twelve years of publication, most issues have featured a theme or focus, in the belief that the best way to present a complex concept is by a group of related articles all contributing to a common objective. When possible, as pages were available, we have tried to supplement themes with a few miscellaneous articles to attract the minds of those readers who really aren't taken by the particular theme. And every year or two, enough interesting, thematically diverse articles are produced during the course of APL's business to warrant a general issue such as this one.

As the problems of technology increase in complexity, the application of the newest mathematical techniques may provide new insights into the behavior of the complex systems of both technology and nature. Our gallimaufry thus starts with two papers that apply some newer mathematical concepts to complexity. Kim Constantikes discusses the use of fractal mathematics for identifying possible targets in a clutter environment. Kenneth Williams applies the techniques of computer neural networks to the prediction of solar activity (a sample of which activity is well illustrated on our front cover by the work of Dave Rust).

The Applied Physics Laboratory has played a major role in the development of an important surface-to-air defensive missile system, the NATO Seasparrow. We have been remiss in not reporting on this earlier in the *Digest*. Charles Roe, in two related articles, discusses some of the history of this program, as seen through APL's relationships with the program office and its contractors and in the APL development of a computer program to control self-defense surface missile system operations. Another significant program, undertaken by APL for the Air Force in the area of strategic missiles rather than tactical systems, has been ARIA/SMILS, the Advanced Range Instrumentation Aircraft/Sonobuoy Missile Impact Locating System. A series of developments have led to major improvements in precision measurement of impact location for reentering missiles in an ocean test range. The overall system and the improvements in the real-time determination of impact position are discussed in a paper by John McIntyre. The development and operation of the postmission processor are described by Dave Artis and Horace Malcom.

Our issue ends with a technical look at an area of considerable controversy, the polygraph. Dale Olsen and his associates discuss some of the system design and data processing techniques APL has been applying to unravel the significance of polygraphic data and to simplify the procedure of collecting it in efforts to determine truth or falsehood. As an organization, APL does not use the polygraph. It does not have sufficient faith in its credibility. On the other hand, it is a device used a great deal by some agencies of the U.S. Government and in the private sector. Applying new techniques of signal processing and system design may contribute to better understanding of the results of the polygraph and establish better criteria for judging its value.

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