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CAPABILITIES

AND

AREAS OF INTEREST

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CAPABILITIES

and

AREAS OF INTEREST

STATOTHR was established to engage in systems analysis, information processing, applied research, design and development in the engineering and physical sciences with emphasis on the production of operationally oriented solutions in the following areas:

SYSTEMS ANALYSIS

- System Integration
- Management Science
- Operations Analysis
- Mathematical Models
- Simulation and Synthesis
- System Performance Evaluation
- System Organization and Control
- Experimental Design and Analysis
- Cost and Operational Effectiveness

The application of systems analysis techniques are fundamental to a thorough understanding of complex operations. The ability to mathematically define and model the system under consideration in itself requires a detailed investigation into the nature of the process whatever its physical and chemical attributes may be.

It is important to approach a system investigation from an engineering point of view, i.e. to establish operational criteria consistent with desired end results, define the appropriate constraints, and provide an output which is operationally useful.

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INFORMATION PROCESSING

- Graphic Analysis
- Signal Processing
- Computer Applications
- Scientific Programming
- Data Reduction and Analysis
- Information Storage and Retrieval
- Information and Technology Transfer
- Information Recording, Processing, Display and Reporduction

New developments in recording techniques and new requirements for utility of data impose the need for composite methods in information processing. While many applications can be developed on purely stochastic terms, a wide variety of modern uses require the reduction of processed data to a result interpretable in terms of the "real world" problem; e.g., it is possible to present cardiographic information in terms understandable to the communication theorist. For most applications, however, these data are useful only by reference to a set of standard responses which are highly subjective in nature. One must therefore consider the intended use, methods of graphic display and the nature of the data as well as the pure signal processing attributes of the problem.

In the recent past, many new developments in handling textual and graphic data have been presented. Other data forms are non-periodic with poorly defined second order statistics. In many cases a combination of file management, information retrieval methods, communication theory and advanced computational techniques provide a basis for attack on the problem.

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APPLIED RESEARCH AND DEVELOPMENT

- Photometry
- Mensuration
- Target Design
- Optical Systems
- Image Enhancement
- Microdensitometry
- Pattern Recognition
- Image Quality Assessment
- Silver and Non-Silver Photographic Science
- Photographic Data Extraction and Analysis
- Optical Data Processing
- Laser Applications
- Image Restoration
- Scanning Systems
- Photogrammetry
- Sensitometry
- Holography

During the past decade extensive research and development has provided the scientific community with a heretofore unavailable variety of techniques and devices. The application of these techniques to recording, processing, reducing, analyzing and interpreting photographic information offers a broad range of opportunities to expand the effectiveness of many operational systems.

The area of reconnaissance and surveillance presents a multitude of problems which require the most advanced technological considerations, e.g., image restoration due to unstable atmospheric conditions, defocusing, vibration and multiple exposure; image rectification due to change of scale and format peculiarities; inter-relationship of multi-sensor outputs; image enhancement; image quality assessment and associated resolution target design; data extraction interms of both pattern recognition and mensuration; photogrammetric evaluation; photo-sensitive detectors and reproduction materials; and high quality optical systems, among others.

It is important to remember, as we apply the various techniques available, that the concentrated effort must not be directed toward technical progress for its own sake, but toward accomplishing the task at hand, viz. detect, store and extract both more and more reliable information from the various detection systems available.

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DESIGN AND ENGINEERING

- Prototype Development
- Photo-optical Detectors and Systems
- Optical, mechanical and Electronic Photo Interpretation Devices

The motivation behind most research and development is to provide an end item - a piece of hardware which is capable of providing either an improved result, or one which was previously unavailable. Good design and engineering allow for a smooth interfacing of new devices with other components of the system.

Introduction of many of the new techniques previously described require original and unique design concepts before they are amenable to operational utilization. It is important that the end use of the technique under consideration be established early and provide the criteria upon which operational implementation is based.

INFORMATION AND COMMUNICATION THEORY

- Digital Filtration
- Digital Spectral Analysis
- Optimum Stimulus Analysis
- Applications of Sampling Theory
- N-Dimensional Frequency Analysis
- Analytical and Statistical Methods
- Autocorrelation/Crosscorrelation Analysis

The uses of information and communication theory have expanded from the electrical field into a wide variety of applications. In particular, the use of these techniques in the graphic field wherein two-dimensional functions are typical, is a fairly recent innovation. In addition, new methods of digital analysis involving high speed algorithms have developed

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in the last few years. By means of these techniques, analytically exact treatment of data can produce high confidence, clearly defined estimates of spectral properties. Careful applications of sampling principles and subsequent digital filtration can, in fact, produce a wide variety of outputs useful for different purposes.

A further recent development in two-dimensional system analysis involves the production of stimuli for the assessment of the impulsive response of such systems. Careful consideration of physical principles and noise properties of the recording medium results in stimuli for the assessment of the impulse response of such systems. careful consideration of physical principles and noise properties of the recording medium results in stimuli and data analysis steps which produce system transfer functions having optimally reduced error.

PERSPECTIVE

STATOTHR intends to emphasize operationally oriented solutions. The optimization of existing concepts, equipment and facilities will receive equal consideration with the investigation and introduction of new developments and devices.

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Next 10 Page(s) In Document Exempt

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