

PACKAGE ID - 001142MLTPL00 STATMON

KWIC TITLE - Statistical Fault Detection & Diagnosis Expert
System

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LIMITATION CODE -COPY **AUDIENCE CODE** - LIM

COMPLETION DATE - 01/01/1996 **PUBLICATION DATE** - 01/09/1906

DESCRIPTION - STATMON is an expert system that performs real-time fault detection and diagnosis of redundant sensors in any industrial process requiring high reliability. After a training period performed during normal operation, the expert system monitors the statistical properties of the incoming signals using a pattern recognition test. If the test determines that statistical properties of the signals have changed, the expert system performs a sequence of logical steps to determine which sensor or machine component has degraded.

PACKAGE CONTENTS - Media Directory; Software Abstract; Media Includes Source Code;

SOURCE CODE INCLUDED? - Yes

MEDIA QUANTITY - 1 3.5 Diskette

METHOD OF SOLUTION - STATMON consists of three stages, using two powerful mathematical techniques in conjunction with an inference engine and knowledge base. In the training stage performed during normal operation, Fourier analysis is used to identify important serial correlation inherent in the signals so this correlation can be filtered out in the following two stages. The fault detection stage performs a sequential probability ratio test, or SPRT, on the incoming signals combined so as to work in real time. This second stage continues until the SPRT determines that the statistics of the signals have changed, at which time a degraded sensor is reported and the expert system enters the fault diagnosis stage. The fault diagnosis stage consists of an inference engine which successfully uses the SPRT and a knowledge base developed from first principles to determine the source of these signal degradation.

COMPUTER - MLT-PLTFM

OPERATING SYSTEMS - AIX, Domain/OS, UNIX SVR4, CLIX, SunOS, OS/MP,
Vax/VMS, PC DOS, SOLARIS

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PROGRAMMING LANGUAGES - C

SOURCE CODE AVAILABLE (Y/N) - Y

UNIQUE FEATURES - The SPRT procedure allows STATMON to determine sensor degradation with user-specified false and missed alarm probabilities. Furthermore, this technique has been shown to determine sensor degradation more rapidly than conventional monitoring techniques. The mathematical methods used in the expert system are general and application independent, working on any process whose signals are contaminated with noise.

RELATED SOFTWARE - The First Class (R) expert system shell was used during development and validation.

OTHER PROG/OPER SYS INFO - All programming and operational features are fully documented with comment lines in STATMON's C source code.

HARDWARE REQS - STATMON requires at least a mips machine.

TIME REQUIREMENTS - STATMON is designed for real time use.

ABSTRACT STATUS - Submitted 12/18/96. Released AS-IS 1/13/97

SUBJECT CLASS CODE - TK

KEYWORDS -

COMPUTER PROGRAM DOCUMENTATION
S CODES
EXPERT SYSTEMS
REAL TIME SYSTEMS
INDUSTRIAL PLANTS
ELECTRONIC EQUIPMENT
MONITORING
FAILURES
SIGNALS
PATTERN RECOGNITION
ARTIFICIAL INTELLIGENCE
ON-LINE SYSTEMS
REACTOR SAFETY
REACTOR MONITORING SYSTEMS
SYSTEM FAILURE ANALYSIS
TIME-SERIES ANALYSIS
PROBABILITY

EDB SUBJECT CATEGORIES -

990200 220900 426000 440800 220400

SPONSOR - DOE/NE

PACKAGE TYPE - AS - IS