

**PACKAGE ID** - 001137MLTPL00 SMP SYSTEM

**KWIC TITLE** - online Surveillance of Industrial Processes  
with Correlated Parameters

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

**COMPLETION DATE** - 08/01/1994   **PUBLICATION DATE** - 08/01/1994

**DESCRIPTION** - SMP is a system for online surveillance of industrial processes or machinery for determination of the incipience or onset of abnormal operating conditions. SMP exploits the cross correlation between all of the sensors that are available on the system under surveillance to provide an extremely high sensitivity for annunciation of subtle disturbances in process variables.

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

**SOURCE CODE INCLUDED?** - Yes

**MEDIA QUANTITY** - 1 3.5 Diskette

**METHOD OF SOLUTION** - The first stage of operation is removal of serial correlation from the signals under surveillance. This stage of the processing minimizes the overall false alarm probability for the system. The serial correlation is removed by one of two user selectable methods: (1) eliminating Fourier components (individual frequencies or bands can be removed), or (2) by using the autocorrelation structure present in the data. The second stage of processing is one in which the Mahalanobis distance (a metric) is calculated for all time points in the training data. The distribution of the distance is computed and from this a cumulative distribution is formed. In the third and final stage of processing, a probability ratio test is employed to determine if there is sufficient evidence to annunciate a warning.

**COMPUTER** - MLT-PLTFM

**OPERATING SYSTEMS** - DOS and UNIX variants

**PROGRAMMING LANGUAGES** - C (70%) C++ (30%)

**SOURCE CODE AVAILABLE (Y/N)** - Y

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**UNIQUE FEATURES** - Use of either an autoregressive or Fourier filter to preprocess the data so that all autocorrelation is removed from the signals. Ability to process multiple sensor output simultaneously. Ability to linearize in a single variable so that piecewise linear response surfaces can be modeled. Use of data to establish an empirical distribution for the Mahalanbois distance. Use of the Sequential Probability Ratio Test (SPRT) to determine when an alarm state is warranted.

**HARDWARE REQS** - Any hardware configuration that can run C and C++ code.

**TIME REQUIREMENTS** - Following a short intialization (or training) period, SMP is designed to run in real-time.

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

**SUBJECT CLASS CODE** - T

**KEYWORDS** -

COMPUTER PROGRAM DOCUMENTATION  
S CODES  
MONITORING  
EXPERT SYSTEMS  
SIGNALS  
VALIDATION  
FAILURES  
DETECTION  
REAL TIME SYSTEMS  
ELECTRONIC EQUIPMENT  
MACHINERY

**EDB SUBJECT CATEGORIES** -  
990200 440800 426000

**SPONSOR** - DOE/ER

**PACKAGE TYPE** - AS - IS