Prototyping Design and Automation
Organizers & Chairs: Kok-Meng Lee, Tarek Sobh

New Trends in Prototyping Design and Automation

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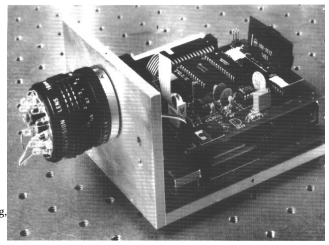
- This paper is written to provide an overview on Symposium on New Trends on Prototyping Design and Automation with an emphasis on the following two subtopics: (1) a review on prototyping discrete event and hybrid systems, and (2) the trends on prototyping real-time machine vision system design.
- This symposium contains five papers, covering the topics of information extraction for engineering design, predictive models of discrete-event and hybrid systems, process planning automation, and prototyping design of vision sensing systems, micro/nano systems, and automated DNA sequencing.
- The overview paper presents the following two subtopics. The first is an overview for the development of a theory for prototyping discrete event and hybrid systems. The second subtopic is an overview of machine vision prototyping design for real-time automation applications.
- A simple software environment system was developed for simulating, analyzing, synthesizing, monitoring, and controlling discrete event and hybrid systems. In addition, we present an alternative vision system to overcome those problems associated with a traditional video-based vision system.



Prototyping Design and Automation of Micro/nano Manipulation System

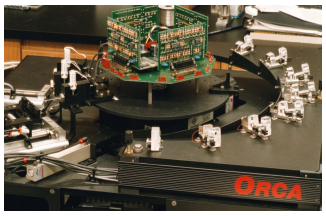
T. Fukuda and F. Arai
Nagoya University

- There is a great demand to manipulate microobjects. Here we classified the micro/nano manipulation and introduced the basic research topics and fundamental technologies.
- We present two examples of prototyping of the micro/nano manipulation system especially for biological applications.

Automating High-Throughput Fluid Sample Handling for Biotechnology and Chemistry

Deirdre Meldrum
University of Washington

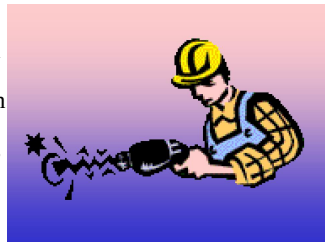
- Automated, high-throughput (5000 samples/8 hours), reduced costs, improved quality, reliable, and reproducible system for genome analysis.
- Use glass capillaries and piezoelectric dispensers to prepare submicroliter reactions.
- First generation system complete; 2nd generation system in testing; biology produced is of high quality and reproducible.
- Automated fluid handling system has been successfully developed. It will be tested soon in large-scale genome centers to prepare samples for DNA sequencing.



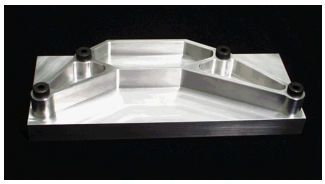
Data Mining in Engineering Design: A Case Study

A. Kusiak and T. L. Tseng
University of Iowa

- New computational paradigm
- Data and parameter prediction
- Novel data mining algorithms
- Accurate results



An Approach to Rapid Manufacturing with Custom Fixturing

Mark Bloomenthal, Richard Riesenfeld, Elaine Cohen, Russell Fish and Samuel Drake
University of Utah

- Automatic generation of process plans with fixturing.
- Quick turn-arounds for functional machined parts.
- Prismatic parts with 4 and 5 axis indexed features.
- Approach: process plan templates.