DBBT
Digital Broadcasting & Broadband Technologies

Co-funded by the Erasmus+ Programme of the European Union

Metode istraživanja

Profesor dr Miroslav Lutovac

"This project has been funded with support from the European Commission. This publication [communication] reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein"

Naučni rad

- Prvo proučiti sve
  - **Kreativnost, ideja, intuicija?**
- Doprinos
  - **Šta ja mogu da izmislim?**
- Već poznato
  - **Drugačija interpretacija, kombinacija?**
- Hipoteza je (ne)očekivana
  - **Prvo hipoteza pa dokaz?**
  - **Prvo rezultat pa hipoteza?**

Knowledge-based planiranje proizvodnih sistema

- Planiranje proizvodnih sistema zasnovanom na znanju

Knowledge-based sistemi

- Genetski algoritmi
- Neuralne mreže
- Sistemi zasnovani na kompjuterskom rezonovanju

Knowledge-based sistemi

- Korišćenje postojećih softverskih rešenja za bolje planiranje
- Razvoj algoritama i alata za planiranje
- Razvoj tehnika za bolje korišćenje kompjuterske snage ili alata
- Napredne tehnike i paradigme korišćenjem računarskih algebarskih sistema

Knowledge-based sistemi

- Vizuelizacija i optimizacija tehnika planiranja
- Korišćenje viših programskih jezika
  - Modelovanje
  - Optimizacija
  - Vizuelizacija

  delova proizvodnog proces
- Integracija sa mernim i proizvodnim mašinama

Efficiency Enhancement of Modern Manufacturing Industries through the Integration of Lean Principles and **Software based Mechatronics Approach:** An Overview

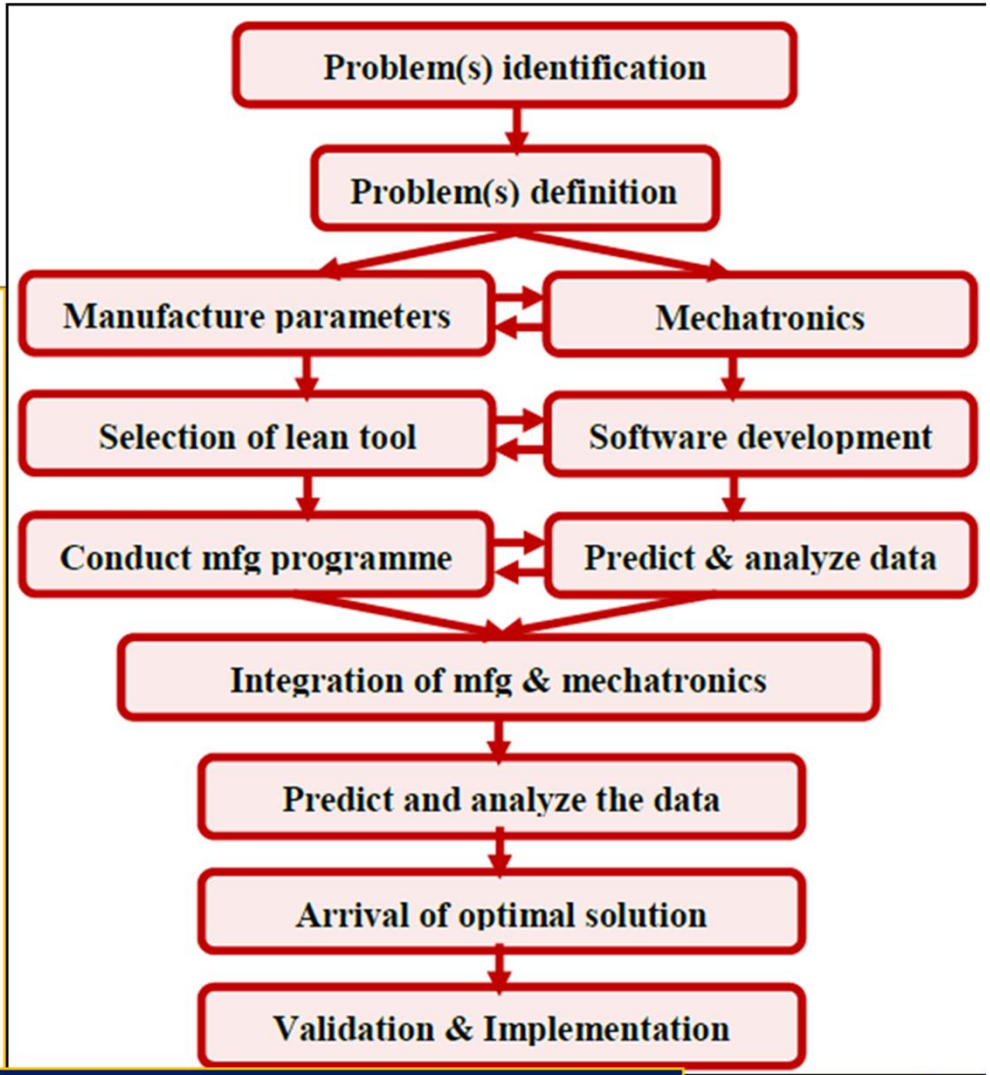
- International Journal of Research and Reviews in Mechatronics Design and Simulation, Vol. 1, No. 2, June 2011

International Journal of Research and Reviews in Mechatronics Design and Simulation
Vol. 1, No. 2, June 2011
ISSN: 2046-6234

www.sciacademypublisher.com

Efficiency Enhancement of

1. Introduction
2. Problem Statement
3. Literature Reviews
4. Background of the paper
5. Research approach
6. Case study
7. Identification of … principle
8. Data collection through software based approach for the selected problem
9. Validation, verification
10. Result and discussions
11. Conclusion

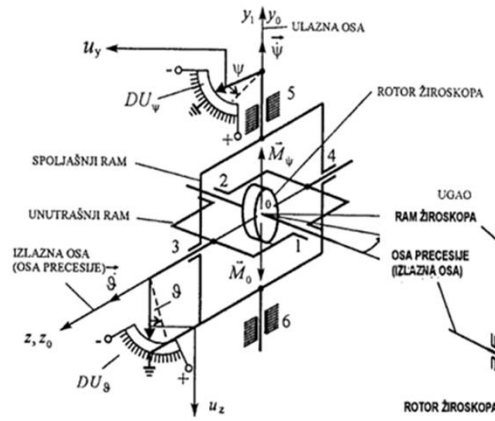


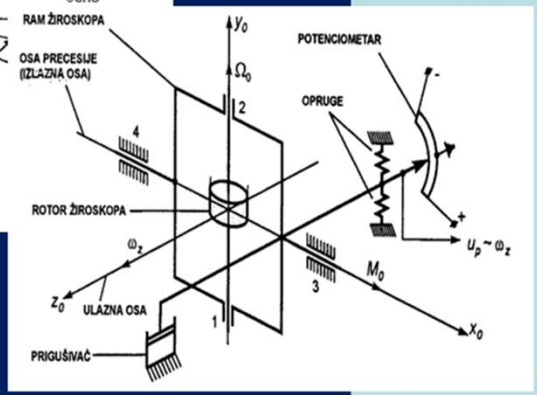
Primer Research Approach

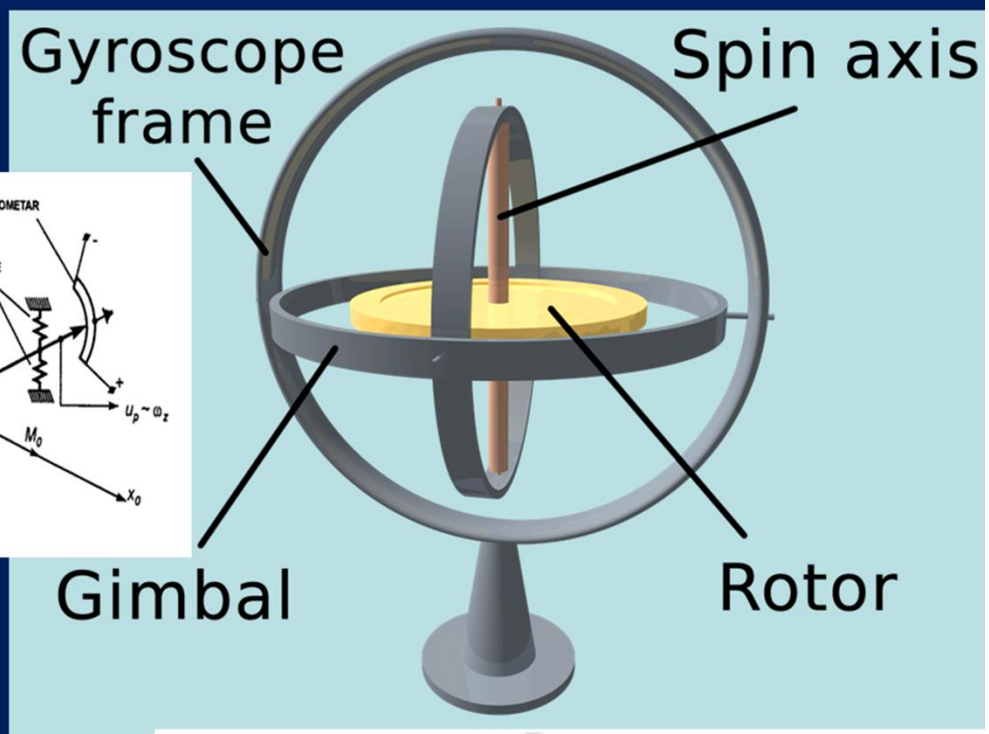
- … companies are in the race for **improving their organizational competitiveness** in order **to compete in the global market**
- Majority of companies have developing different technologies which requires **effective integration** of the key variables and a **user-friendly interface** in order to achieve world class manufacturing and to **survive in the long run**

- **Mechatronics** is the combination of mechanical engineering,
  - electronic engineering,
  - computer engineering,
  - software engineering,
  - control engineering, and
  - systems design engineering

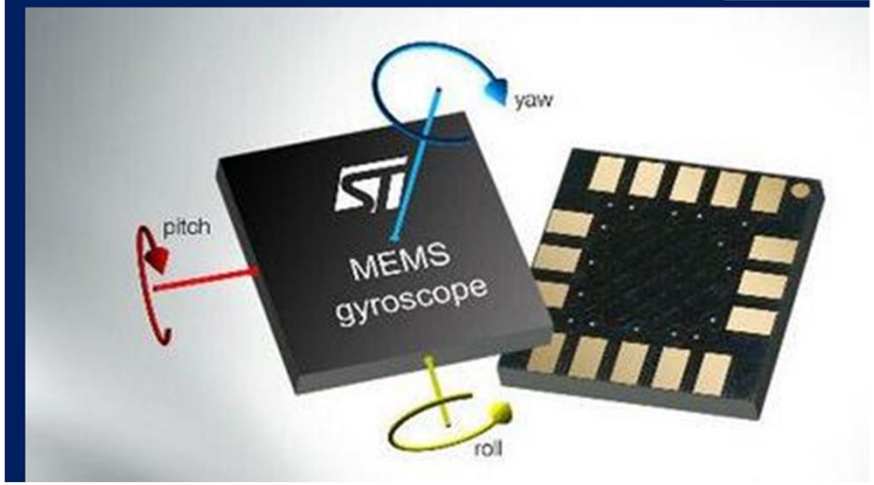
in order to design and manufacture useful products

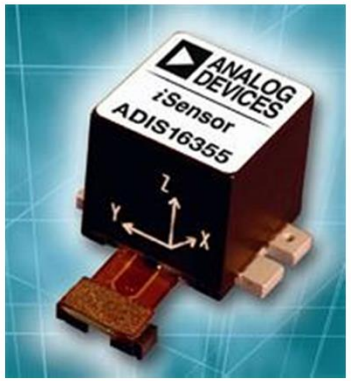


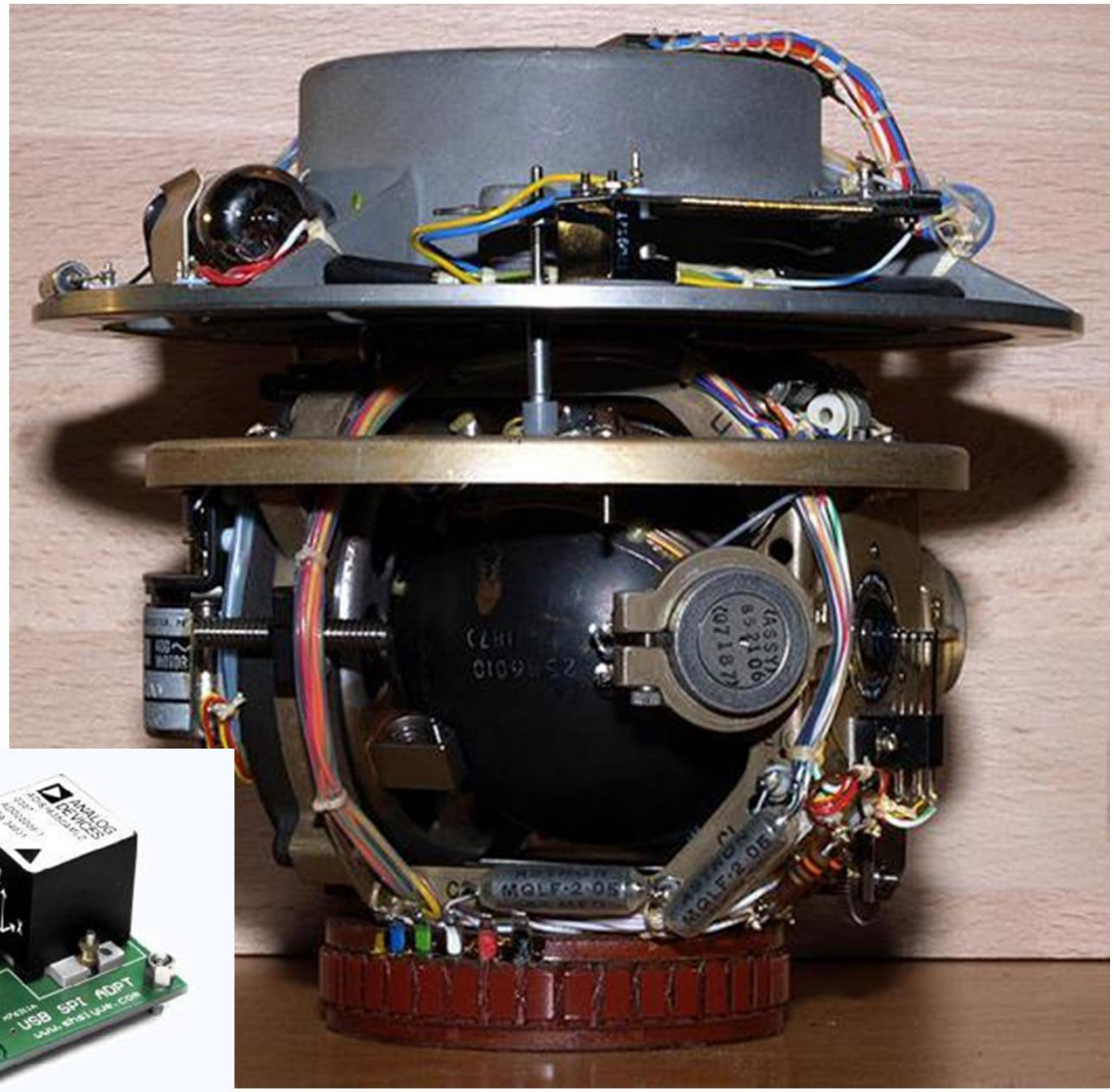




Primer gyroscope

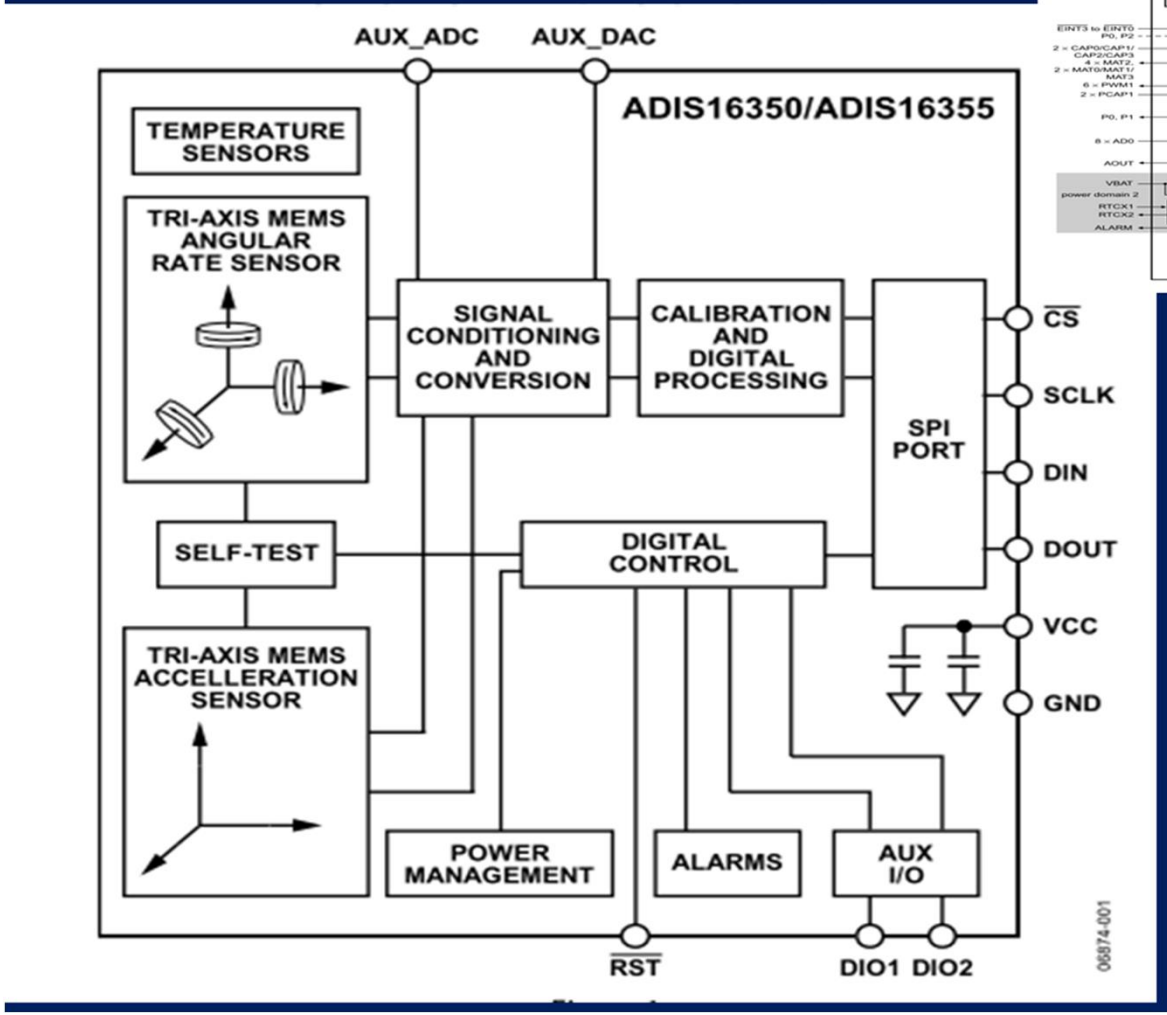


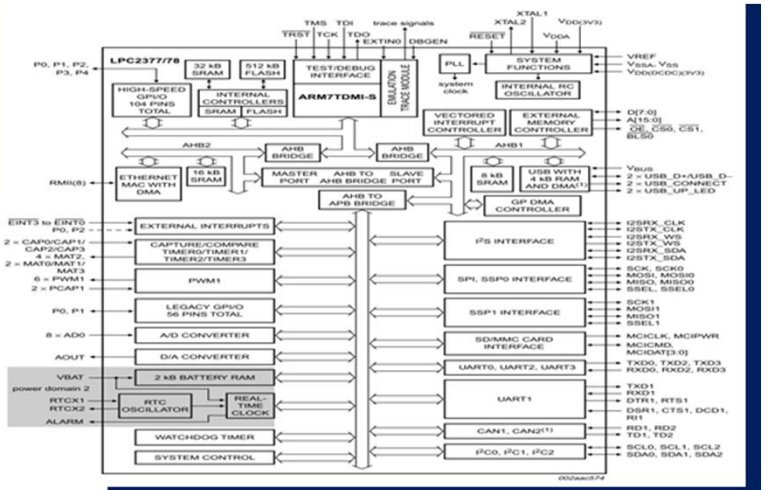




Primer gyroscope

Primer gyroscope





- Methodology to **integrate** the lean manufacturing principles and the software based mechatronics systems in their factory premises for taking necessary steps to **reduce the experimental cost, internal cost and improve the customer satisfaction**
- The lean manufacturing tools and techniques are used to **identify the existing wastages, problems, suggestions for improvements** …

- The software based mechatronics approach is used **to predict** and analyze the relevant data pertaining to the same
- The usefulness of this approach is not only applicable for pump manufacturing industries but also various industrial segments, which would enable to cater the **current and future customer demanding needs**

Review of Economic Dynamics, 2013

- Trade and market selection:
  Evidence from manufacturing plants in
- … examine the link between trade **liberalization and aggregate productivity**, with a focus on improved market selection resulting from a **reduction in trade barriers** and in the dispersion of these barriers across producers. An additional advantage of our analysis is that our TFP measure does not include demand and price effects.
  We find that reduced trade protection makes plant survival **depend more closely on productivity**.
  Using a **dynamic simulation**, we find that **enhanced selection increases aggregate productivity substantially**.

Intternattiionall Journall off Industtriiall Engiineeriing & Producttiion Research, 2014

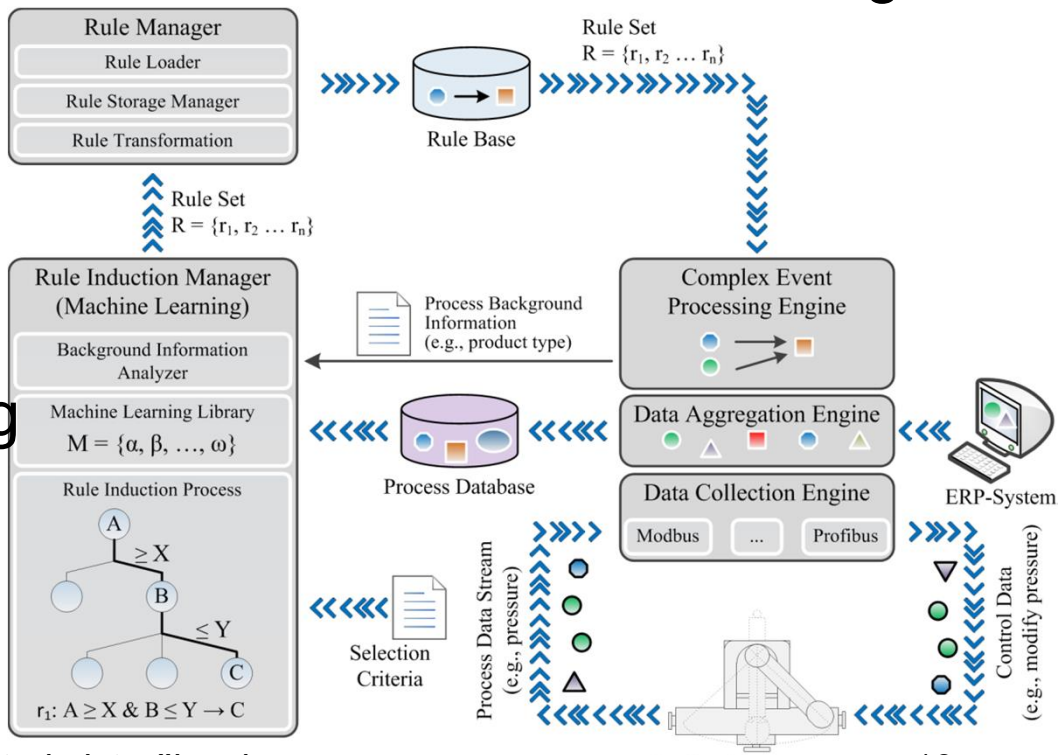
- Two-Stage Hybrid Flowshop Scheduling Problem with Serial Batching
- As industries are facing **increasingly competitive situations**, many **classical manufacturing systems** shift **to novel environments** such as hybrid flow shop in which a combination of flow shop and **parallel machines operates together**.
- … **genetic algorithm** is developed to give near optimal solutions

Intternattiionall Journall off Industtriiall Engiineeriing & Producttiion Research, 2014

- A **Multi Objective Optimization Model** for Redundancy Allocation Problems in Series-Parallel Systems with Repairable Components
- … propose an optimization model for determining the structure of a series-parallel system. … the main contribution … to expand the redundancy allocation parallel problems to systems that have repairable components. … two objectives: **maximizing the system mean time to first failure** and **minimizing the total cost** of the system. … Competitive **Algorithm** …

eKNOW 2012 : The 4th Int. Conf. on Information, Process, & Knowledge Management

- Self-Learning Monitoring & Control of Manufacturing Processes **Based on Rule** Induction & Event Processing Design for Manufacturing
- Introduction
- Problem description
- State-of-the-art
- Approach for self-learning monitoring & control
- Industrial case study
- Conclusion & future work



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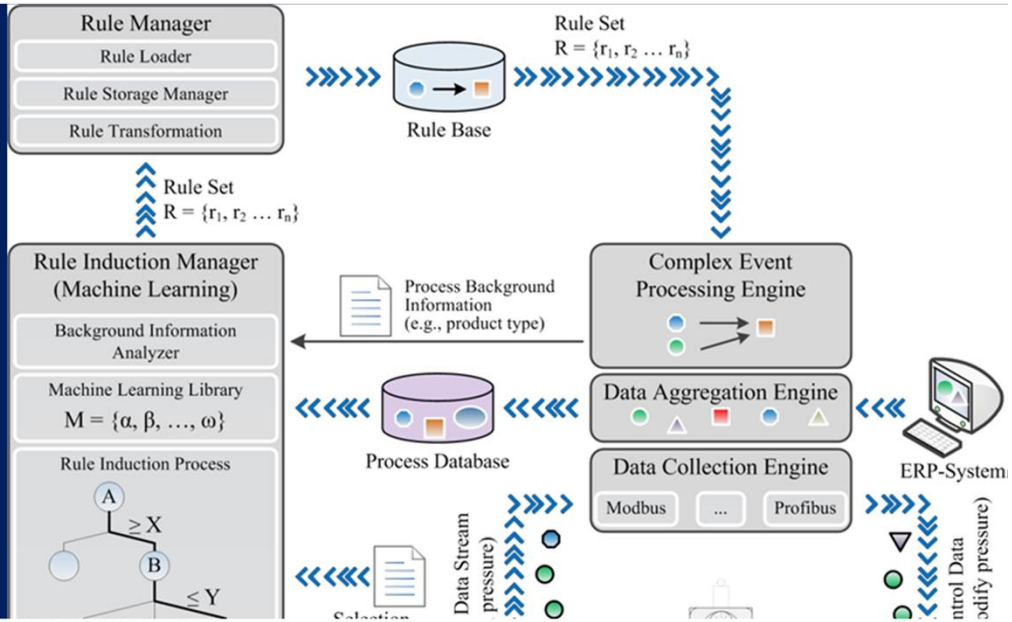
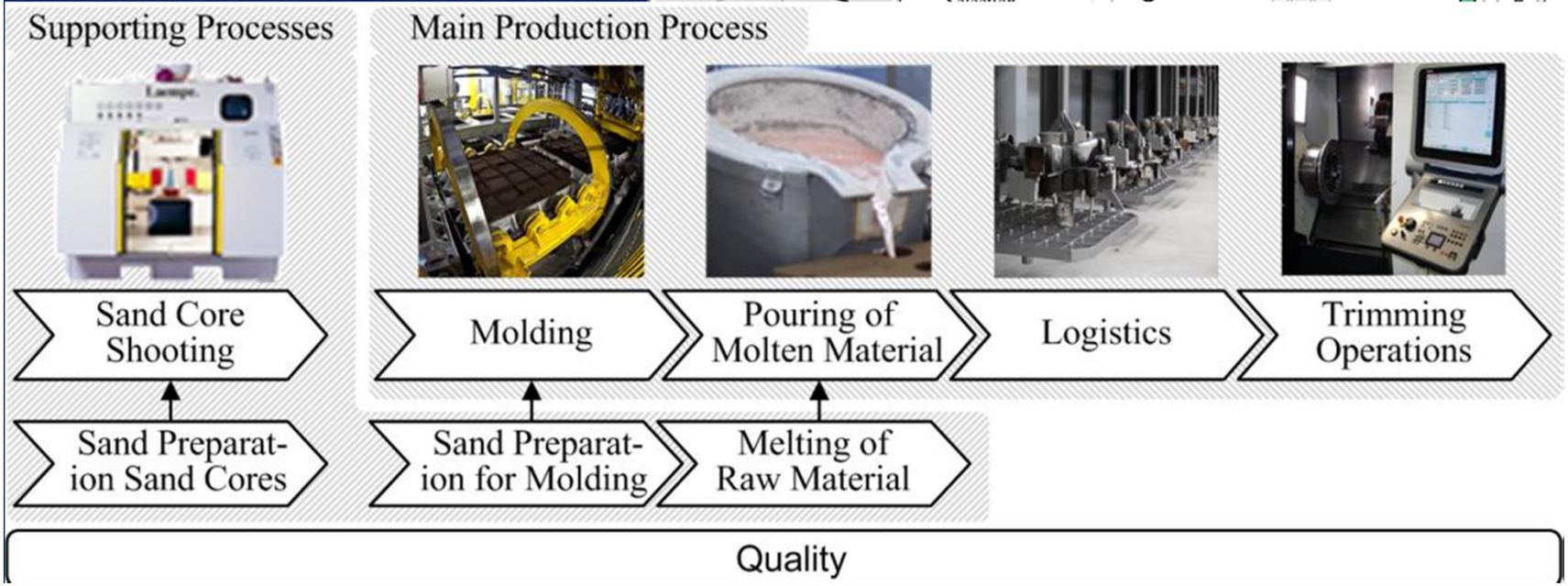




Knowledge-based system for collaborative process specification

- **Problem**: In **past decades**, enterprises could operate alone in relatively **stable** and **predictable environments**
- The distribution of information and the **exponential emergence of new technologies** have started to **erode the stability** of this environment
- Operating in such environments is becoming **increasingly more difficult**

Knowledge-based system for collaborative process specification

- **Problems**
- **erode the stability** of the environment
- **market** is more **open** and **globalized**
- **small and medium-sized ent**erprises (SMEs), are facing **competition** from large organizations for market share and profits in business
- The capacity of enterprises to collaborate or **interact with their partners** is a crucial factor for their development and their ability to survive

Knowledge-based system for collaborative process specification

- **Solution**
- enterprises require the **agility** to be able to operate under such pressures
- started developing and establishing more and more **collaborative projects** in response to various challenges
  - **complementary skills**
  - **platforms for group buying**
  - maintain the inter-enterprise relationships

- The **Semantic Web** provides a common framework that allows data to be shared and reused across application, enterprise, and community boundaries
- The idea of **knowledge representation** (KR) from **artificial intelligence** (AI) to be useful on Web. These included languages based on HTML, XML, and various frame-based KR languages and **knowledge acquisition approaches**
- **Web Ontology** Language (OWL) is a family of knowledge representation languages for authoring ontologies - RDF/XML serializations for the Semantic Web

- The **Resource Description Framework** RDF is a family of World Wide Web Consortium W3C specifications originally designed as a **metadata data model**.
  It has come to be used as a general method for **conceptual description or modeling of information** that is **implemented in web resources**, using a variety of syntax formats
- **Extensible Markup Language** XML defines a set of rules for encoding documents in a format that is both human-readable and machine-readable

A review of **simulation-based intelligent decision** support system architecture for the **adaptive control** of **flexible manufacturing systems**

Journal of Artificial Intelligence 3 (4): 201-219, 2010
ISSN 1994-5450

A Review of Simulation-based Intelligent Decision Support System Architecture for the Adaptive Control of Flexible Manufacturing Systems

- … system for reactive scheduling decision-making in FMS **Model-based approach** for component simulation development **Automatic simulation model** for simulation-based **real-time** shop floor control Knowledge-based support for simulation analysis of manufacturing cells Object …

Development of a simulation-based decision support system for controlling stochastic flexible job shop manufacturing systems

Simulation Modelling Practice and Theory 18 (2010) 768–786

Contents lists available at ScienceDirect

Simulation Modelling Practice and Theory

journal homepage: www.elsevier.com/locate/simpat

- a simulation-based **decision support system** (DSS) to production control of a **stochastic flexible job shop** (SFJS) manufacturing system
- The model is validated by some **benchmark test** problems

Toward a knowledge-based theory of the firm

Theories of the firm are conceptualizations and models of business enterprises which explain and **predict** their **structure** and **behaviors**. Although economists use the term theory of the firm in its singular form, there is no single, **multipurpose** theory

7320 пута наведен

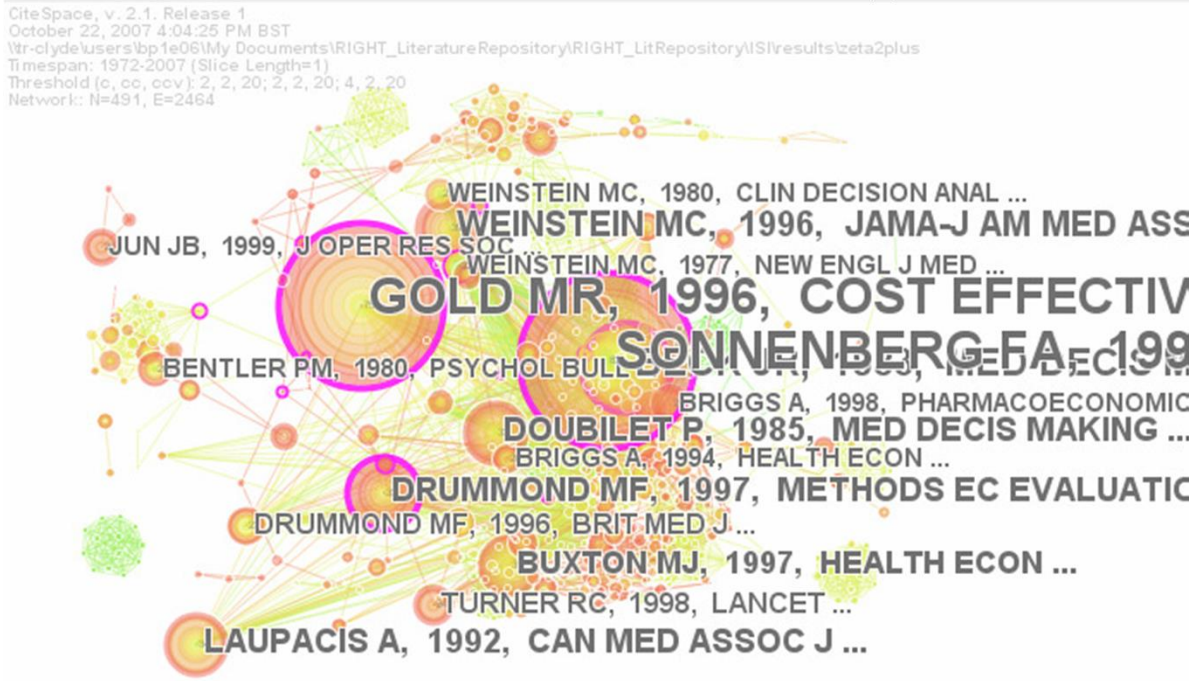
Strategic Management Journal (1986-1998); Winter 1996; 17, Winter Special Issue; ABI/INFORM Global
pg. 109

Strategic Management Journal Vol. 17 Winter Special Issue), 109–122 (1996)

TOWARD A KNOWLEDGE-BASED THEORY OF THE FIRM

ROBERT M. GRANT
School of Business, Georgetown University, Washington, DC, U.S.A.

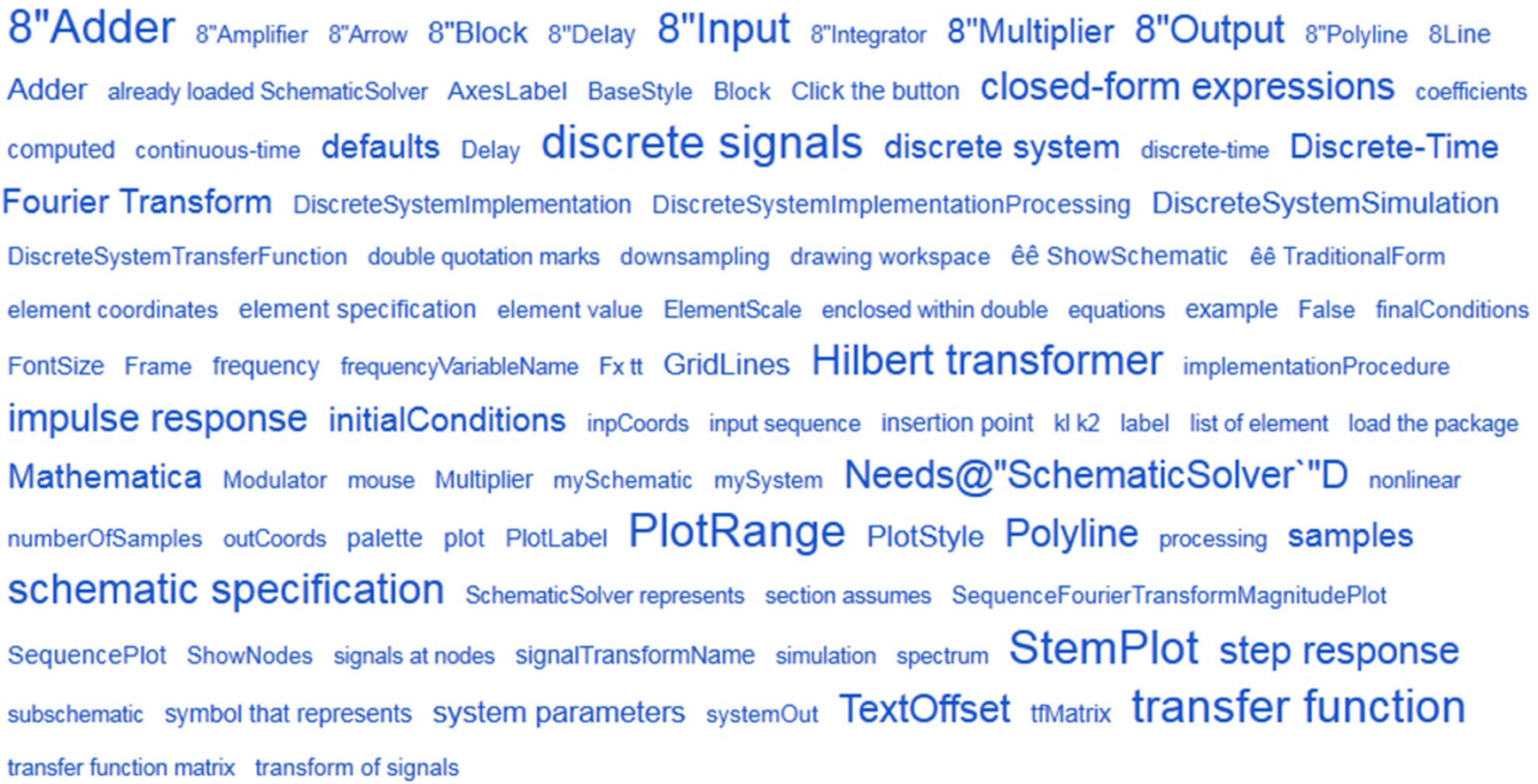
A Rapid Review Method for Extremely Large Corpora. of Literature: Applications to the domains of Modelling, Simulation, & Management



- CiteSpace is a freely available Java application for visualizing and analyzing trends and patterns in scientific literature

SchematicSolver - Symbolic Signal Processing

Чести термини и фразе



A Component Based **Reconfigurable** Manufacturing Execution System

A Component Based Reconfigurable Manufacturing Execution System
Zhaohui Li, Yan Chen, Lixin Shen

A Component Based Reconfigurable Manufacturing Execution System

Advances in information Sciences and Service Sciences(AISS)
Volume3, Number10,November 2011
doi : 10.4156/AISS.vol3.issue10.21

- … With reference to the configuration idea set forth in the field of **industrial control system** and taking full advantage of workflow and **Multi-agents**, this paper puts forward a **Component Based Reconfigurable Manufacturing Execution System** (CBRMES).…

Ontology-based Reconfiguration Agent for Intelligent Mechatronic Systems in Flexible Manufacturing

- This paper proposes an approach to achieving **fast reconfiguration of modular manufacturing systems**, based on an ontology-based reconfiguration agent.
- The agent **uses ontological knowledge** of the manufacturing environment for the purpose of **reconfiguration without human** intervention.
- The current **mass customization** era requires **increased flexibility and agility** in the manufacturing systems to adapt changes in manufacturing requirements and environments.....

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Forthcoming Papers > **International Journal of Reasoning-based Intelligent Systems (IJRIS)** *Journal Homepage*

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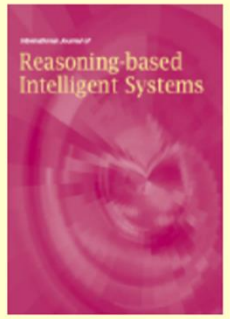
International Journal of Reasoning-based Intelligent Systems (12 papers in press)

Regular Issue

- **Complex Hadamard transform of digital signals: properties and applications**
  by Rumen P. Mironov, Roumen K. Kountchev
- **Automated knowledge based filter synthesis using modified Legendre approximation and optimisation of summed sensitivity**
  by Vlastimir D. Pavlović, Maja M. Lutovac, Miroslav D. Lutovac



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» Editorial Board
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» Sample issue
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Browse Recent Issues:

Automated knowledge based filter synthesis using modified Legendre approximation and optimization of summed sensitivity

$$I_{\min}(\omega) = \int_0^1 p(\omega) A_n(\omega^2) d(\omega)$$

The minimum of the ratio of the reflected power

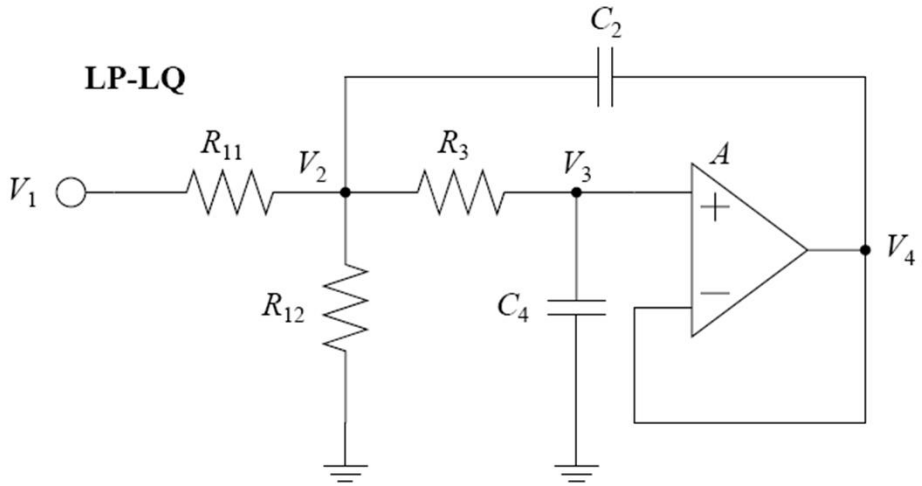
$$\phi(b_0, b_2, b_4, b_6, \ldots b_{2n}, \lambda_0, \lambda_1) =$$

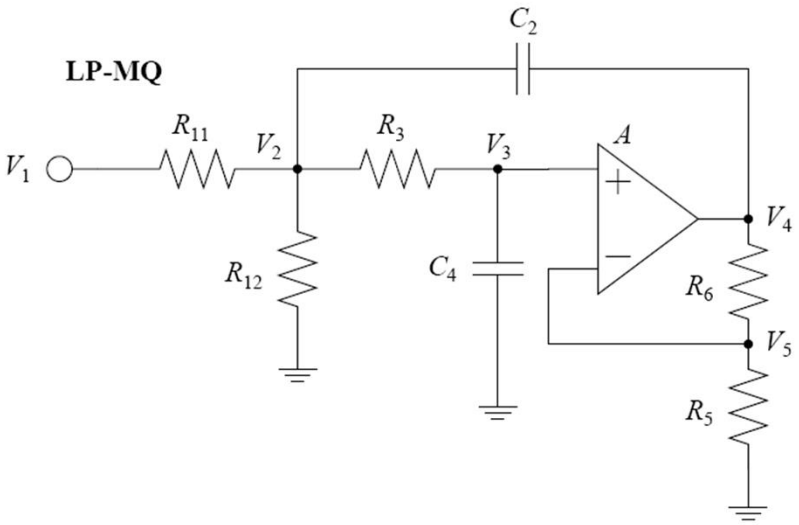
$$\int_0^1 [\sum_{r=0}^{r=n} b_{2r} P_{2r}(\omega)]^2 d(\omega) -$$

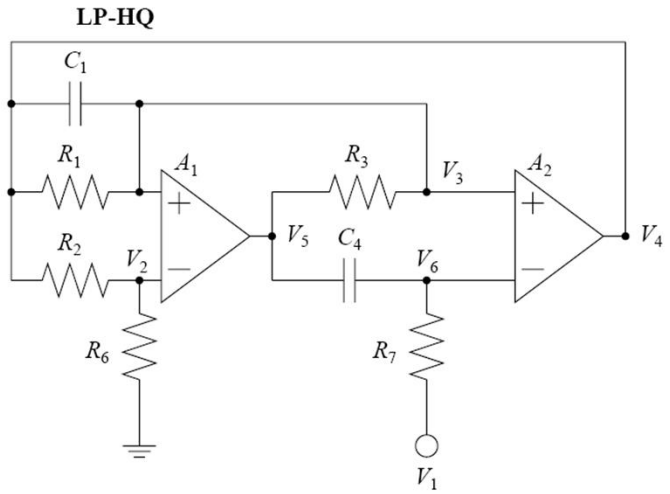
$$\lambda_0 [\sum_{r=0}^{r=n} b_{2r} P_{2r}(0)] - \lambda_1 [\sum_{r=0}^{r=n} b_{2r} P_{2r}(1) - 1]$$

Automated building knowledge

- Automated synthesis

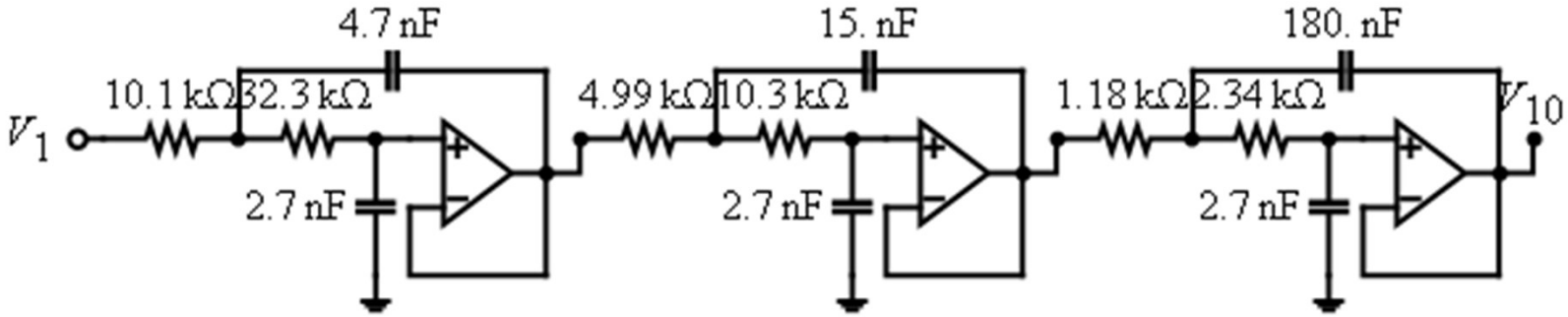






Usage of knowledge

- Synthesized the sixth-order filter



Usage of knowledge

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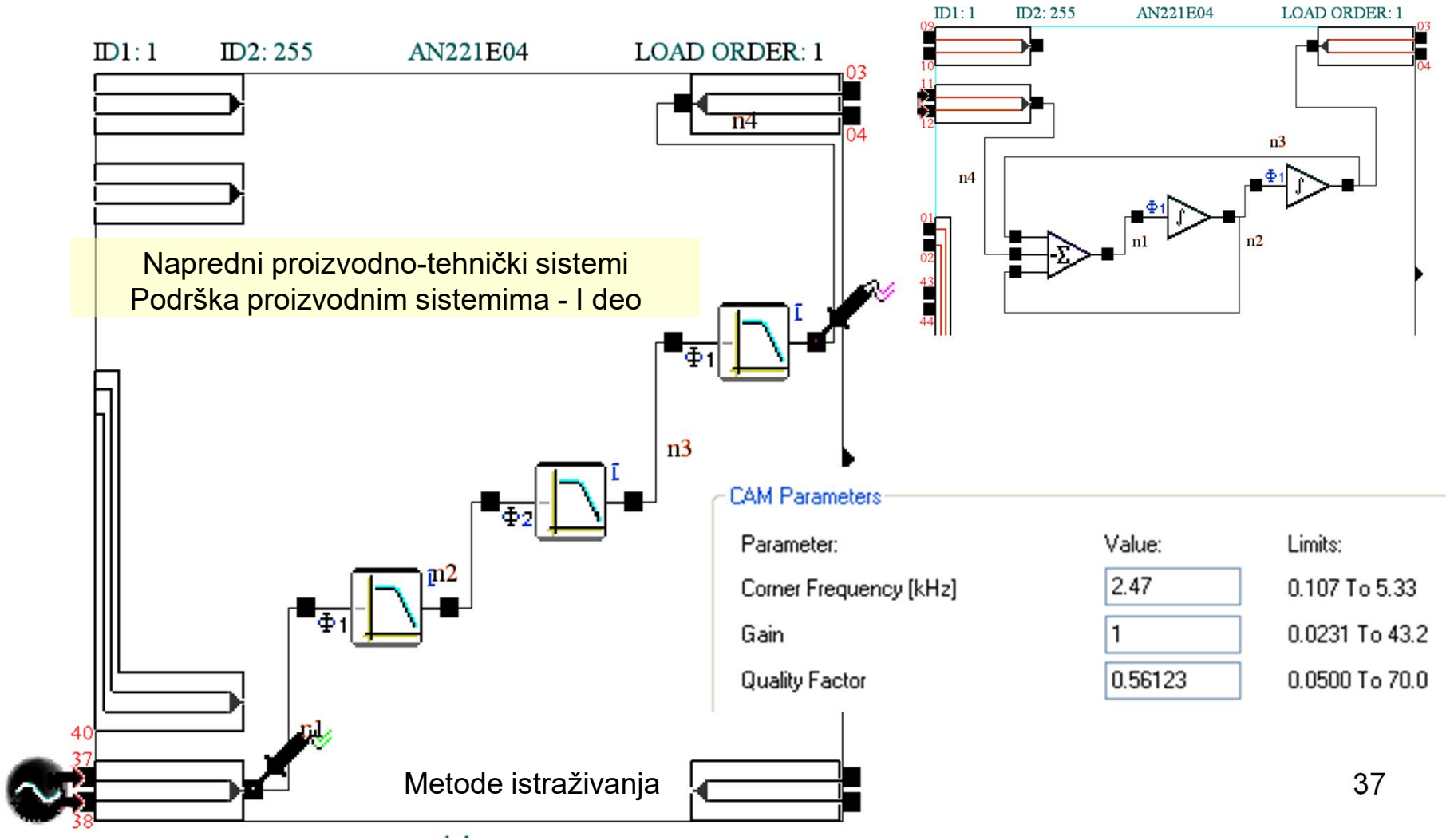
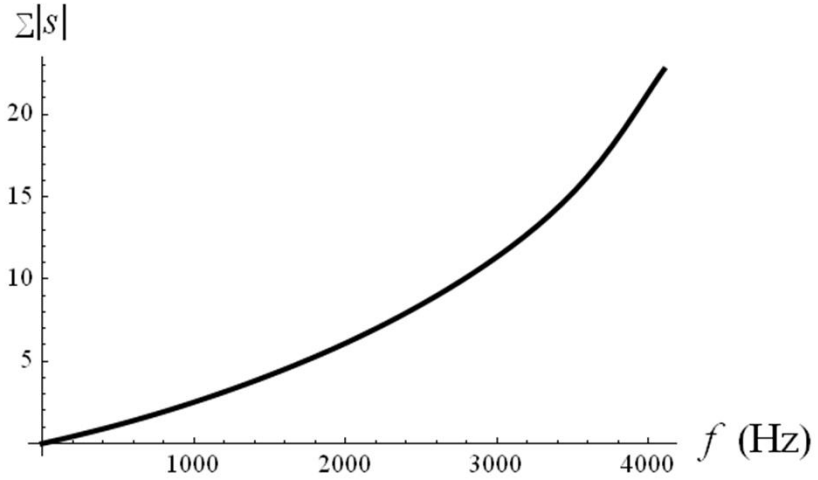
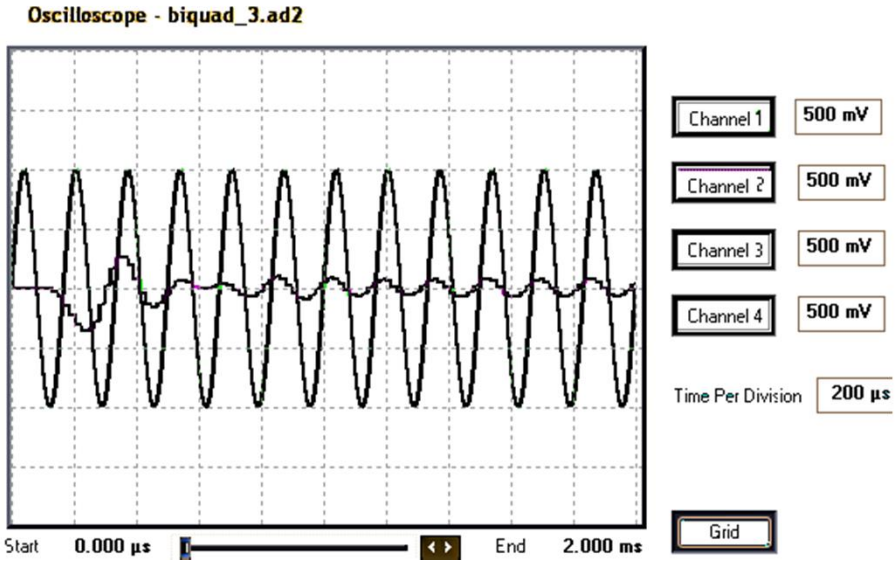
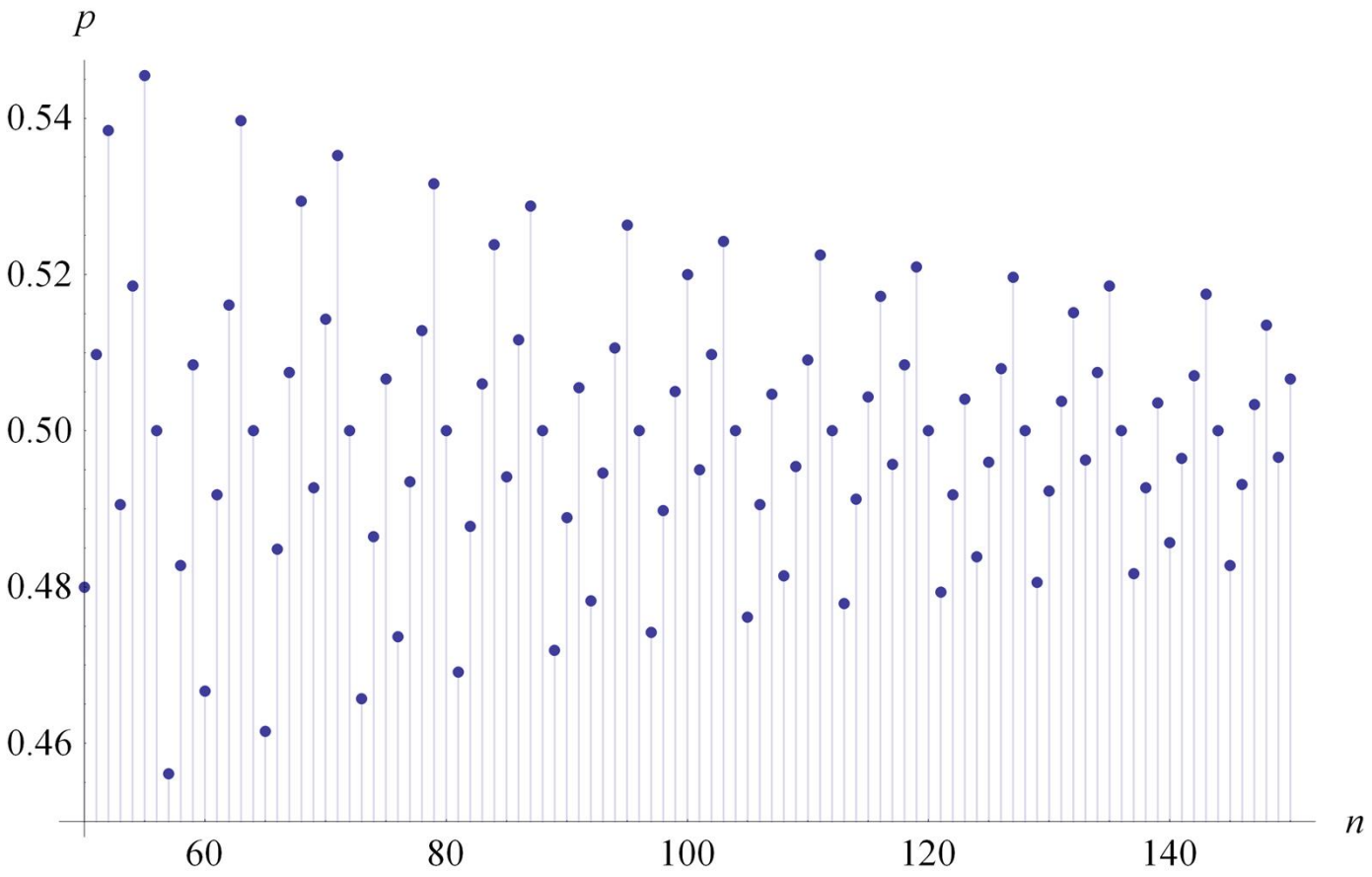


Verification

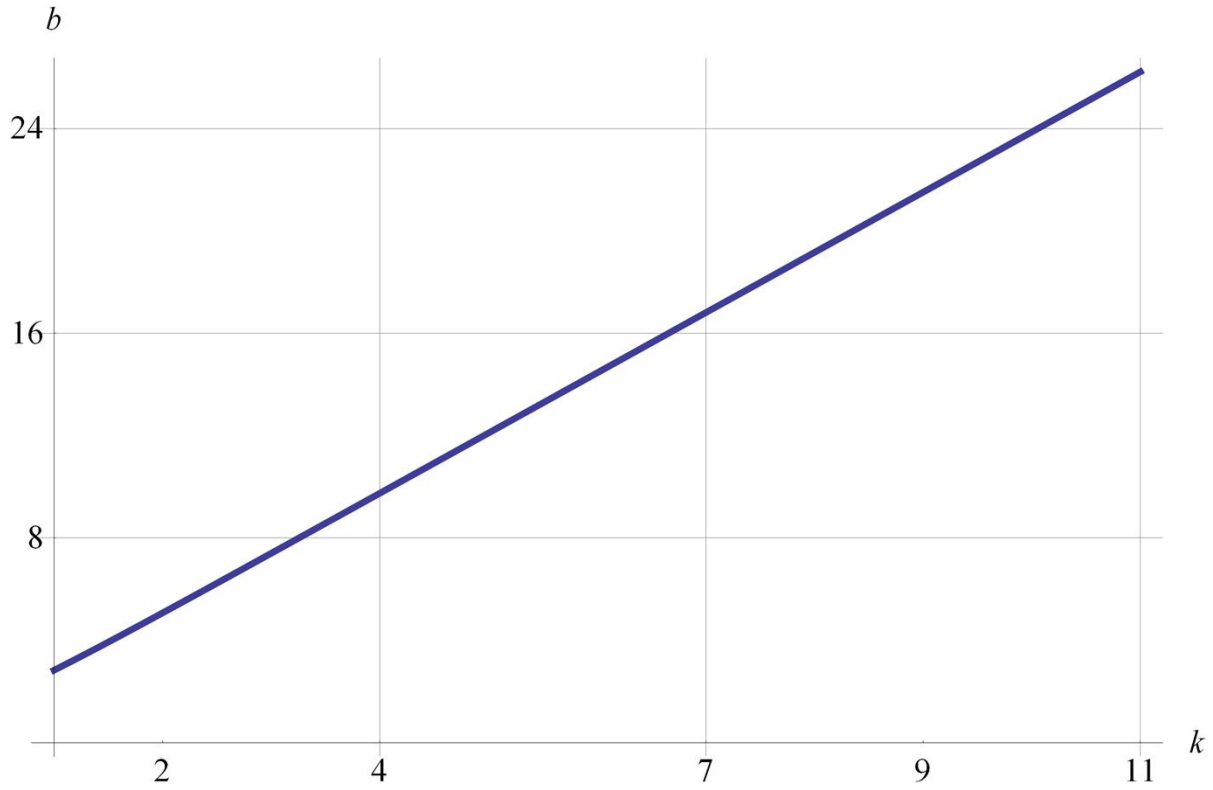




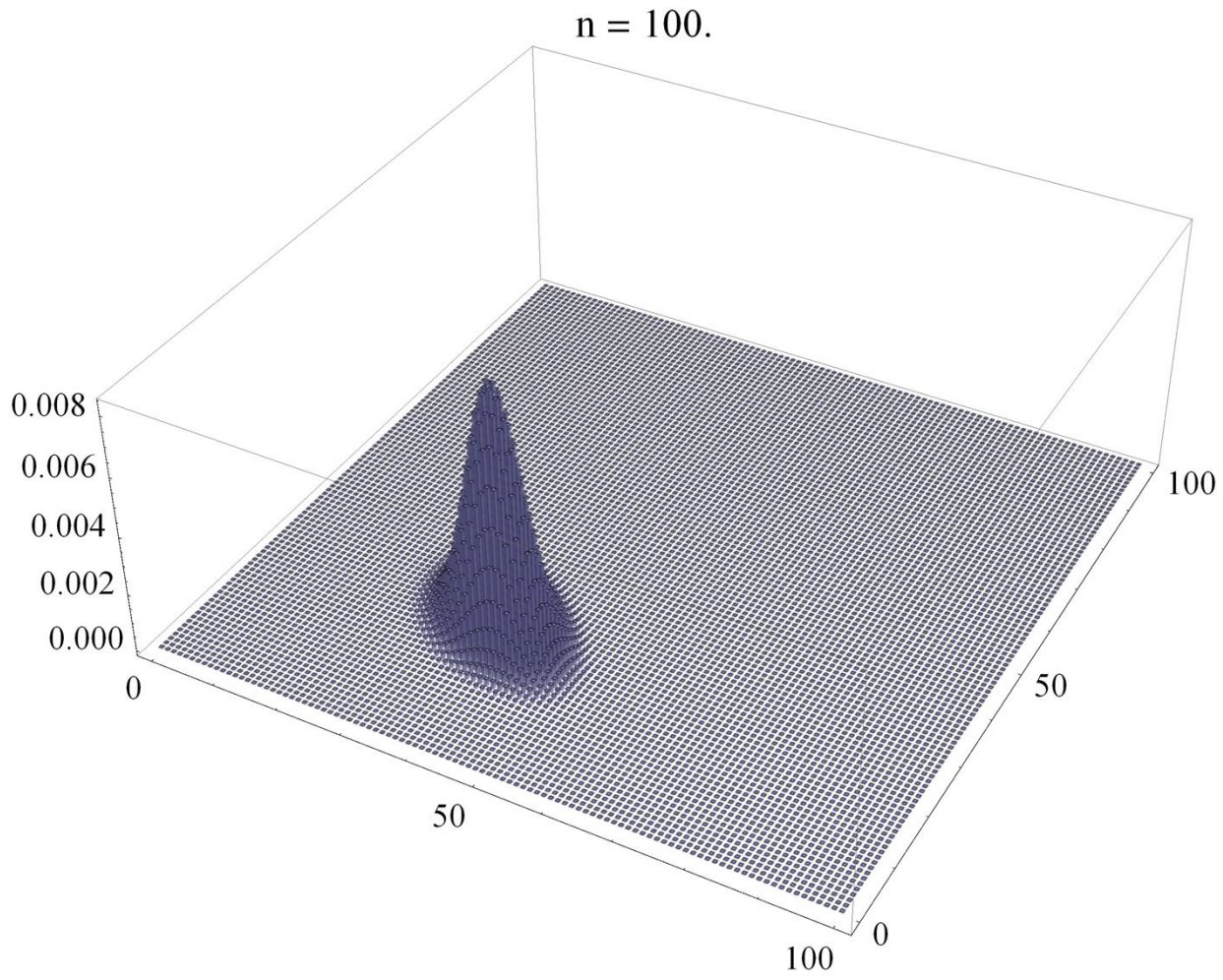
Estimate value of *p* in terms of the number of observed objects *n*



Number of exact bits of estimated *p* vs. number iterations *k*



Graphical presentation of the trinomial distribution



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