



2014, XVI, 294 p. 81 illus., 73 illus. in color.

 **Printed book****Hardcover**

► 129,99 € | £117.00 | \$179.00

► \*139,09 € (D) | 142,99 € (A) | CHF 173.50

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C. Alippi

**Intelligence for Embedded Systems**

A Methodological Approach

- A comprehensive, interdisciplinary treatment of intelligent systems, teaching the reader everything from metrology to cognition
- Shows students and engineers how to understand basic mechanisms and design advanced applications, feeding a digital world eager for intelligent mechanisms
- Introduces researchers to ideas characterizing the transition from one generation of intelligent devices to the next

Addressing current issues of which any engineer or computer scientist should be aware, this monograph is a response to the need to adopt a new computational paradigm as the methodological basis for designing pervasive embedded systems with sensor capabilities. The requirements of this paradigm are to control complexity, to limit cost and energy consumption, and to provide adaptation and cognition abilities allowing the embedded system to interact proactively with the real world. The quest for such intelligence requires the formalization of a new generation of intelligent systems able to exploit advances in digital architectures and in sensing technologies. The book sheds light on the theory behind intelligence for embedded systems with specific focus on:

- robustness (the robustness of a computational flow and its evaluation);
- intelligence (how to mimic the adaptation and cognition abilities of the human brain),
- the capacity to learn in non-stationary and evolving environments by detecting changes and reacting accordingly; and
- a new paradigm that, by accepting results that are correct in probability, allows the complexity of the embedded application to be kept under control.

Theories, concepts and methods are provided to motivate researchers in this exciting and timely interdisciplinary area. Applications such as porting a neural network from a high-precision platform to a digital embedded system and evaluating its robustness level are described. Examples show how the methodology introduced can be adopted in the case of cyber-physical systems to manage the interaction between embedded devices and physical world..



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# Table of Contents

## 1 Introduction

## 2 From metrology to digital data

**2.1 Measure and measurements:** The measurement chain; Modeling the measurement process; Accuracy; Precision; Resolution

**2.2 A deterministic vs. a stochastic representation of data:** A deterministic representation: noise-free data; A stochastic representation: noise-affected data; The signal to noise ratio

## 3 Uncertainty, information and learning mechanisms

**3.1 Uncertainty and perturbations:** From errors to perturbations; Perturbations

**3.2 Perturbations at the data representation level:** Natural Numbers  $\mathbb{N}$ : Binary natural; Integer Numbers  $\mathbb{Z}$ : 2's complement; 2cp notation; Rational  $\mathbb{Q}$  and real  $\mathbb{R}$  numbers;

**3.3 Propagation of uncertainty:** Linear functions; Nonlinear functions

**3.4 Learning from data and uncertainty at the model level:** Basics of Learning: inherent, approximation and estimation risks; The bias-variance tradeoff; Non-linear regression; Linear regression; Linear time-invariant predictive models; Uncertainty at the application level

## 4 Randomized Algorithms

**4.1 Computational complexity: Analysis of algorithms:** P, NP complete and NP-hard problems

**4.2 Monte Carlo:** The idea behind Monte Carlo; Weak and strong laws of large numbers; Some convergence results; The curse of dimensionality and Monte Carlo;

**4.3 Bounds on the number of samples:** The Bernoulli bound; The Chernoff bound; A bound on samples to estimate the maximum value of a function;

**4.4 Randomized algorithms:** The algorithm verification problem; The maximum value estimation problem; The expectation estimation problem; The minimum (maximum) expectation problem;

**4.5 Controlling the statistical volume of the sampling space**

## 5 Robustness analysis

**5.1 Problem formalization:** Robustness; Robustness at the computational flow level;

**5.2 Robustness in the small:** Evaluating the impact of small perturbations at the function output; Perturbations at the empirical risk level; Perturbations at the structural risk level; Theory highlights on robustness;

**5.3 Robustness in the large:** Problem definition: the  $u(\delta_0)$  case; Randomized algorithms and robustness: the  $u(\delta_0)$  case; The maximum expectation problem;

## 6 Emotional cognitive mechanisms for embedded systems

**6.1 Emotional cognitive structure**

**6.2 Automatic and controlled processes:** Automatic processes; Controlled Processes;

**6.3 Basic functions of the neural emotional system:** Amygdala; Long-term memory; Basal ganglia; Lateral prefrontal and association cortices; Anterior cingulate cortex; Orbital and ventral-medial prefrontal cortices; Hippocampus;

**6.4 Emotion and decision-making;**

## 7 Performance estimation and Probably Approximately Correct Computation

**7.1 Accuracy estimation: figures of merit:** Squared error; Kullback-Leibler;  $L_p$  norms and other figures of merit;

**7.2 Probably approximately correct computation**

**7.3 The performance verification problem:** The performance satisfaction problem; The figure of merit expectation problem; The maximum performance problem; The PACC problem; The minimum(maximum)-perturbed expectation problem;

**7.4 Accuracy estimation: a given dataset case:** Problem formalization; The Bootstrap method; The bag of little bootstraps method

**7.5 Cognitive processes and PACC**

**7.6 Example: Accuracy assessment in embedded systems**

## 8 Intelligent mechanisms in embedded systems

**8.1 Adaptation at the power supply voltage and processor frequency levels:** On-line DVFS; Off-line DVFS;

**8.2 Adaptive sensing and its policies:** Hierarchical sensing techniques; Adaptive sampling;

**8.3 Adaptation at the energy harvesting level:** The incremental conductance approach; The perturb and observe approach;

**8.4 Intelligent algorithms for clock synchronization:** Clock synchronization: the framework; Statistic methods for clock synchronization; Adaptive methods for clock synchronization; Predictive methods for clock synchronization;

**8.5 Localization and tracking:** RSS-based localization; Time of arrival-based localization; Angle-of-arrival based localization; Frequency-of-arrival based method;

**8.6 Adaptation at the application code level:** Remote parametric-code reprogrammability; Remote code reprogrammability; Decision support system; Online hardware reprogrammability; An application: the Rialba monitoring system;

## 9 Learning in nonstationary and evolving environments

**9.1 Passive and active learning:** Passive learning; Active learning;

**9.2 Change point methods:** Change-points; Set dissimilarity; The change-point formulation; Test statistics used in CPMs; Extensions over the basic scheme;

**9.3 Change detection tests:** The CUSUM CDT family; The intersection of confidence intervals CDT family; VM-PFC: the H-CDT;

**9.4 The just in time learning framework:** Observation Model; The JIT Classifier; Gradual Concept Drift; JIT for Gradual Concept Drift; Amygdala - VM-PFC - LPAC- ACC: the JIT approach;

## 10 Fault diagnosis systems

**10.1 Model-based fault detection and isolation;**

**10.2 Model-free fault detection and isolation:** FDS: the sensor level case; FDS: changes in a sensor-sensor relationship; FDS: the multi sensors case;

**10.3 Amygdala - VM-PFC: FDS at the multi sensor level;**