1. Record Nr. UNINA9910760270703321 Autore Eremenko Volodymyr Titolo Advanced Information-Measuring Technologies and Systems I Pubbl/distr/stampa Cham:,: Springer International Publishing AG,, 2023 ©2024 **ISBN** 9783031407185 3031407180 Edizione [1st ed.] Descrizione fisica 1 online resource (282 pages) Studies in Systems, Decision and Control Series;; v.439 Collana Altri autori (Persone) ZaporozhetsArtur Soggetti Metrology Neural networks (Computer science) Lingua di pubblicazione Inglese **Formato** Materiale a stampa Livello bibliografico Monografia

Nota di contenuto

Intro -- Preface -- Contents -- Metrological Support of Measurement Channels with Bridge Circuits -- 1 Bridge Circuit-Based Sensor Simulator -- 2 Error Correction of the Sensor Simulator Output Signal with Bridge Circuit Caused by Difference Between the Real Circuit Resistance and the Calculated Values -- 3 Conversion Equation of Measuring Channels -- References -- Application of Exponential Splines in the Measurement and Control of Electric Circuit Parameters -- 1 Complex Electric Circuit Parameters Control -- 2 The Discrete Synthesis of Test Signals Based on Exponential Splines -- 2.1 The Definition -- 2.2 The Discrete Synthesis -- 2.3 Signal-Forming Circuit Model -- 2.4 The TF of the Forming Circuit -- 2.5 Exponential Splines. Time Domain, Relative Scale -- 2.6 Examples of Synthesized Splines and Signal Generation -- 3 Analysis of the Errors in Determining the Parameters of Electric Circuits Due to the Approximation of Test Signals by Splines -- 3.1 Methods of Building a Spline Model Test Signal -- 3.2 Interpolation of the Ideal Test Signal -- 3.3 Methodical Error Component Due to Interpolation -- 3.4 Approximation with Minimum Absolute Error on Each Approximation interval -- 3.5 "Interpolation" of an Ideal Response -- 3.6 Estimation of the Methodical Error Component Caused by the Approximation Method -- 4 Conclusions -- References -- Improving of Methods of Impedance

Parameters Units Reproduction and Measurement Accuracy Increasing for Ensuring Metrological Traceability -- 1 The Need for Improvement the Accuracy of Electrical Impedance Parameters Units Measurements -- 2 Analysis and Optimization of Transfer Schemes and Reproducing Methods of Impedance Parameters Units -- 3 Increasing the Accuracy of the Impedance Unit Size Transfer in Low-Resistance Range of Values by the Equal-Nominal Comparing Method. 4 Constructive and Technological Methods of Increasing the Accuracy of Measurements to Ensure Metrological Traceability of Impedance Parameters Units in the Range of Values -- 4.1 Violation of the Connection Four-Parity in the Region of Low-Resistance Impedances due to a Change in the Geometry of the Current Lines at the Potential Electrode When Varying Current Sources -- 4.2 Difference of Temperature Coefficient Between Conductor and Measure -- 4.3 Violation of the Connection Four-Parity When Connecting Several Measures (Assemblies) Due to Mutual Induction -- 4.4 Violation of the Four-Parity Due to Distributed Capacitance Between the Conductors and the Common Shield -- 5 Estimation of Measurement Uncertainty in the Calibration of Precision Measures of Electrical Capacitance with Reference to the Standard Measure of Capacitance of the Same Nominal Value on the National Standard of Units of Electrical Capacitance and Dissipation Factor -- 6 Ensuring the Traceability of Measurements of Electrical Capacitance and Active Resistance -- 7 Transfer of the Electrical Capacitance Unit Size by the Range of Values Using the National Standard of Units of Electrical Capacitance and the Dissipation Factor -- 8 Uncertainty Estimation in the Calibration of Inductance Measures with Traceability to Capacitance Standards -- 9 Calibration Method of Precision LCR-Meters -- 9.1 Calibration of a Precision LCR Meter for Measuring Active Resistance -- 9.2 Calibration of a Precision LCR-Meter for Measuring Inductance -- 9.3 Calibration of a Precision LCR-Meter for Measuring Electrical Capacitance -- 10 Conclusions -- References --Implementation of Information and Measurement Systems at the Base of Specialized Internet Protocols -- 1 Organization of Distributed Data Collection Systems Based on Network Intelligent Sensors. 1.1 Features of the Use of Intelligent Sensors in Distributed Data Collection Systems -- 1.2 Organization of Network Data Collection Systems Based on the IEEE 1451 Group of Standards -- 1.3 Development of Hardware and Software of the STIM Module of Intelligent Sensors of the IEEE 1451 Standard -- 1.4 Implementation of the NCAP Module of Intelligent Sensors According to the IEEE 1451 Standard Based on a Single-Board Java Microserver Cubieboard -- 2 Development of Network Intelligent Sensors Based on the Specialized Web Protocol MQTT -- 2.1 Peculiarities of Using the MQTT Protocol in Network Data Collection Systems -- 2.2 Development of Hardware and Software of Intelligent Sensors Based on the uIP Library -- 2.3 Development of Software for Setting Network Parameters of Intelligent Sensors Using Flash Memory -- 2.4 Development of DHCP Protocol Support Software -- 2.5 Development of Data Exchange Software Using the MQTT Protocol -- 2.6 Development of Software for Remote Configuration of Intelligent Sensors -- 3 Development of Components of Network Microcontroller Data Collection Systems Based on RESTful Web Services -- 3.1 Peculiarities of Using RESTful Web Services in Network Data Collection Systems -- 3.2 Development of Software for Supporting RESTful Web Services Based on Java Microservers -- 3.3 Development of RESTful Web Service Support Software for the STIM Module According to the IEEE 1451 Standard Based on a Raspberry Pi Single-Board Computer -- 3.4 Development of RESTful Web Service

Support Software for the NCAP Module Based on Cubieboard Java Microserver -- 4 Development of a Network Data Collection System Based on MQTT Protocol and RESTful Web Service -- 4.1 Development of the Structure of the Interaction of the Components of the Network Data Collection System.

4.2 Development of a RESTful Web Service Interface of a Network Data Collection System -- 4.3 Software Development of a Network Data Collection System Based on the MQTT Protocol and a RESTful Web Service -- 4.4 Development of RESTful Web Service Implementation Software -- References -- Model of Information Signals Formation in the Diagnostics of Composite Products -- 1 Structure of Diagnostic Information Processes -- 2 Mathematical Model of the Information-Signal Field -- 3 Diagnostic Method -- 4 Experimental Studies -- 5 Conclusions -- References -- Theory and Practice of Ensuring the Validity in Testing Laboratories -- 1 Features of Ensuring the Validity in Testing Laboratories -- 2 Approaches to the Organization and Assurance of Reliability in Laboratories -- 3 Analyzing Laboratory Processes for Validity Assurance -- 3.1 Equipment Management -- 3.2 Personnel Management -- 3.3 Validation of Methods -- 3.4 Evaluating the Uncertainty of a Test Result -- 3.5 Determination of Requirements for Facilities and Their Control -- 3.6 Differences Between the Request or Tender and the Contract --3.7 Externally Provided Products -- 3.8 Control of Data and Information Management -- 3.9 Ensuring the Impartiality -- 3.10 Sampling -- 3.11 Risk Management, Improvement, and Management Reviews --References -- Methodology for Controlling Greenhouse Microclimate Parameters and Yield Forecast Using Neural Network Technologies -- 1 Justification of the Task's Relevance. Review and Analysis of Microclimate Parameters -- 2 Development of a Mathematical Model of the Greenhouse -- 3 Development of the Structure of the Greenhouse Monitoring and Control System -- 4 Neural Network Development for Prediction and Control of Microclimate Parameters --References.

Sommario/riassunto

This book, part of the 'Studies in Systems, Decision and Control' series, explores advanced technologies and systems with a focus on information and measurement systems. Edited by Volodymyr Eremenko and Artur Zaporozhets, it presents research conducted at the National Technical University of Ukraine, covering topics such as metrological support, exponential splines in electric circuits, and improvements in impedance measurement accuracy. The book also discusses distributed microcontroller systems, diagnostics of composite products, and methodologies for testing laboratory validity. Additionally, it features a study on neural network technologies for greenhouse microclimate control. The book aims to advance the understanding and application of complex systems in various scientific fields, targeting researchers and professionals in systems science and engineering.