CONTENTS AND ABSTRACTS

RADIO ENGINEERING AND COMMUNICATION SYSTEMS

Keywords: information transmission system, energy efficiency, IoT, Bluetooth Low Energy, power consumption.

The problem of increasing the energy efficiency of wireless IoT sensors is considered. The task is to find the optimal combination of operating modes of wireless IoT sensor to ensure the highest energy efficiency. The aim of the work is to increase energy efficiency of autonomous wireless IoT sensors by optimizing the operating modes of its receiving and transmitting module. In order to identify the operating modes of Riot wireless sensor, as well as to assess the level of power consumption in various operating modes, the study of wireless IoT Bluetooth tag is conducted. A comparative analysis of operating modes, as well as power consumption of IoT tags with Bluetooth 4.0 and 5.2 versions is carried out. The results obtained are of practical importance for the design and operation of energy-efficient information transmission systems of the Internet of Things network.

Keywords: maximum spectral component, maximum likelihood method, interfering reflectors, distance measurement error, frequency ranging, likelihood function, difference frequency signal, reference signal, interference amplitude, interference location.

The article analyzes the error in estimating the distance by rangefinder with frequency modulation of the emitted signal, caused by the influence of interfering reflectors. The reason for the appearance of interfering reflections is the presence of parasitic reflecting elements in rangefinder working area, along with useful reflector. Reducing the influence of interfering reflectors on the accuracy of distance estimation is achieved by including in reference signal composition the likelihood function of the component caused by the influence of interference. The specificity of interference caused by interfering reflectors is that it is a signal with non-random unknown parameters. To include such interference in reference signal composition of likelihood function, it is necessary to estimate its amplitude, phase. The aim of this work is to determine the error in measuring the distance when including in reference signal composition the likelihood function of the signal corresponding to interference, with a preliminary estimate of its amplitude and phase.

INTELLIGENT INFORMATION SYSTEMS AND TECHNOLOGIES

MATHEMATICAL AND COMPUTER MODELING

SYSTEM ANALYSIS, MANAGEMENT AND INFORMATION PROCESSING

INFORMATION-MEASUREMENT AND CONTROL SYSTEMS

Keywords: information processes, multidimensional signals, simulation modeling of processes, numerical data processing, technical means for ensuring the functioning of telecommunication systems.

Main theoretical principles and methods of practical application of simulation modeling in telecommunication systems are considered. The aim of the work is to generalize basic theoretical principles of simulating the signals with various physical nature as information processes, and to develop methodology for building software and hardware complexes of simulation modeling in real time. Software and hardware complexes are designed to ensure the functioning of telecommunication systems, radar and sonar stations.

Keywords: modeling, analog-to-digital converter, measuring signal, integral nonlinearity, error, modulus, histogram, time, code.

The paper considers the problem of modeling a new method of ADC metrological testing, which reduces the requirements for reference measuring instruments in terms of accuracy class taking into account nonlinear component of measurement signal (MS). The aim of the work is to evaluate the effectiveness of a new method by means of simulation modeling in LabVIEW graphic programming environment, by comparing the calculated one with the given (true) integral nonlinearity (INL) of ADC. Modeling was carried out on real conversion function (CF) of 12-bit ADC at various combinations of average number of ADC code appearances per quantization interval and additive noise amplitude. The maximum deviation of real shape of generated MS from ideal linear shape was 2 % of MS input range. The simulation results have shown that a new method can accurately estimate ADC integral nonlinearity with an error of less than 1 LSB (least significant bit).

PHYSICAL ELECTRONICS

Keywords: tripole mass analyzer, inlet aperture, mass peak, resolution, mass peak intensity.

The influence of input aperture shift and shape on the analytical characteristics of a tripole mass analyzer is studied. The influence of input aperture shift relative to analyzer axis on its analytical characteristics is investigated by numerical modeling of tripole mass analyzer operation. It is shown that the permissible shift of water aperture from corner electrode, which does not lead to a significant deterioration in analytical characteristics, is 0.05 of distance from analyzer axis to hyperbolic electrode. The influence of

BRIEF REPORTS

Keywords: coding theory, optimization coding theory, error-correcting codes, binary codes, symbolic codes, error propagation, multi-threshold decoding algorithm.

The problem of error correction when transmitting data over noisy channels, the effective solution of which is based on the use of error-correction codes and methods for their decoding is considered. The aim of the work is to familiarize the reader with the main stages of coding theory development. The most significant results, the appearance of which led to the emergence and development of both classical coding theory and optimization coding theory are described.