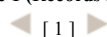


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**Record 1 of 7****Title:** A generic method to construct new customized-shaped chaotic systems using the relative motion concept**Author(s):** Curiac, DI (Curiac, Daniel-Ioan); Volosencu, C (Volosencu, Constantin)**Source:** NONLINEAR ANALYSIS-MODELLING AND CONTROL **Volume:** 21 **Issue:** 3 **Pages:** 413-423 **Published:** 2016**Times Cited in Web of Science Core Collection:** 0**Total Times Cited:** 0**Usage Count (Last 180 days):** 2**Usage Count (Since 2013):** 2**Cited Reference Count:** 21

Abstract: Constructing chaotic systems tailored for each particular real-world application has been a long-term research desideratum. We report a solution for this problem based on the concept of relative motion. We investigate the periodic motion on a closed contour of a coordinate frame in which a chaotic system evolves. By combining these two motions (periodic on a close contour and chaotic) new customized shape trajectories are acquired. We demonstrate that these trajectories obtained in the stationary frame are also chaotic and, moreover, conserve the Lyapunov exponents of the initial chaotic system. Based on this finding, we developed an innovative method to construct new chaotic systems with customized shapes, thus fulfilling the requirements of any particular application of chaos.

Accession Number: WOS:000375346700008**Language:** English**Document Type:** Article**Author Keywords:** chaotic system; relative motion; Lyapunov exponents**Addresses:** [Curiac, Daniel-Ioan; Volosencu, Constantin] Politehn Univ Timisoara, Dept Automat & Appl Informat, Bd V Parvan 2, Timisoara 300223, Romania.**Reprint Address:** Curiac, DI; Volosencu, C (reprint author), Politehn Univ Timisoara, Dept Automat & Appl Informat, Bd V Parvan 2, Timisoara 300223, Romania.**E-mail Addresses:** daniel.curiac@aut.upt.ro; constantin.volosencu@aut.upt.ro**Publisher:** INST MATHEMATICS & INFORMATICS**Publisher Address:** AKADEMIJOS STR 4, VILNIUS LT-08663, LITHUANIA**Web of Science Categories:** Mathematics, Applied; Mathematics, Interdisciplinary Applications; Mechanics**Research Areas:** Mathematics; Mechanics**IDS Number:** DL0TY**ISSN:** 1392-5113**29-char Source Abbrev.:** NONLINEAR ANAL-MODEL**ISO Source Abbrev.:** Nonlinear Anal.-Model Control**Source Item Page Count:** 11**Record 2 of 7****Title:** Path Planning Algorithm based on Arnold Cat Map for Surveillance UAVs**Author(s):** Curiac, DI (Curiac, Daniel-Ioan); Volosencu, C (Volosencu, Constantin)**Source:** DEFENCE SCIENCE JOURNAL **Volume:** 65 **Issue:** 6 **Pages:** 483-488 **DOI:** 10.14429/dsj.65.8483 **Published:** NOV 2015**Times Cited in Web of Science Core Collection:** 0**Total Times Cited:** 0**Usage Count (Last 180 days):** 2**Usage Count (Since 2013):** 8**Cited Reference Count:** 24

Abstract: During their task accomplishment, autonomous unmanned aerial vehicles are facing more and more threats coming from both ground and air. In such adversarial environments, with no a priori information about the threats, a flying robot in charge with surveilling a specified 3D sector must perform its tasks by evolving on misleading and unpredictable trajectories to cope with enemy entities. In our view, the chaotic dynamics can be the cornerstone in designing unpredictable paths for such missions, even though this solution was not exploited until now by researchers in the 3D context. This paper addresses the flight path-planning issue for surveilling a given volume in adversarial conditions by proposing a proficient approach that uses the chaotic behaviour exhibited by the 3D Arnold's cat map. By knowing the exact location of the volume under surveillance before take-off, the flying robot will generate the successive chaotic waypoints only with onboard resources, in an efficient manner. The method is validated by simulation in a realistic scenario using a detailed Simulink model for the X-4 Flyer quadcopter.

Accession Number: WOS:000367186300010**Language:** English**Document Type:** Article**Author Keywords:** Unmanned aerial vehicle; adversarial environment; chaotic path; 3D Arnold's cat map; volume surveillance**KeyWords Plus:** STRATEGIES; MISSIONS; SYSTEM**Addresses:** [Curiac, Daniel-Ioan; Volosencu, Constantin] Politehn Univ Timisoara, Automat & Appl Informat Dept, Timisoara 300223 2, Romania.**Reprint Address:** Curiac, DI (reprint author), Politehn Univ Timisoara, Automat & Appl Informat Dept, Timisoara 300223 2, Romania.**E-mail Addresses:** constantin.volosencu@aut.upt.ro**Publisher:** DEFENCE SCIENTIFIC INFORMATION DOCUMENTATION CENTRE**Publisher Address:** METCALFE HOUSE, DELHI 110054, INDIA**Web of Science Categories:** Multidisciplinary Sciences**Research Areas:** Science & Technology - Other Topics**IDS Number:** CZ6BO**ISSN:** 0011-748X**eISSN:** 0976-464X**29-char Source Abbrev.:** DEFENCE SCI J**ISO Source Abbrev.:** Def. Sci. J.**Source Item Page Count:** 6**Record 3 of 7****Title:** Imparting protean behavior to mobile robots accomplishing patrolling tasks in the presence of adversaries**Author(s):** Curiac, DI (Curiac, Daniel-Ioan); Volosencu, C (Volosencu, Constantin)**Source:** BIOINSPIRATION & BIOMIMETICS **Volume:** 10 **Issue:** 5 **Article Number:** 056017 **DOI:** 10.1088/1748-3190/10/5/056017 **Published:** OCT 2015**Times Cited in Web of Science Core Collection:** 0**Total Times Cited:** 0**Usage Count (Last 180 days):** 1**Usage Count (Since 2013):** 5**Cited Reference Count:** 32

Abstract: Providing unpredictable trajectories for patrol robots is essential when coping with adversaries. In order to solve this problem we developed an effective approach based on the known protean behavior of individual prey animals-random zig-zag movement. The proposed bio-inspired method modifies the normal robot's path by incorporating sudden and irregular direction changes without jeopardizing the robot's mission. Such a tactic is aimed to confuse the enemy (e.g. a sniper), offering less time to acquire and

retain sight alignment and sight picture. This idea is implemented by simulating a series of fictive-temporary obstacles that will randomly appear in the robot's field of view, deceiving the obstacle avoiding mechanism to react. The new general methodology is particularized by using the Arnold's cat map to obtain the timely random appearance and disappearance of the fictive obstacles. The viability of the proposed method is confirmed through an extensive simulation case study.

Accession Number: WOS:000363543700026

PubMed ID: 26447459

Language: English

Document Type: Article

Author Keywords: protean behavior; mobile robot; adversarial patrolling; path's unpredictability; fictive-temporary obstacle; Arnold's cat map

KeyWords Plus: ALGORITHMS

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Publisher: IOP PUBLISHING LTD

Publisher Address: TEMPLE CIRCUS, TEMPLE WAY, BRISTOL BS1 6BE, ENGLAND

Web of Science Categories: Engineering, Multidisciplinary; Materials Science, Biomaterials; Robotics

Research Areas: Engineering; Materials Science; Robotics

IDS Number: CU5AM

ISSN: 1748-3182

eISSN: 1748-3190

29-char Source Abbrev.: BIOINSPIR BIOMIM

ISO Source Abbrev.: Bioinspir. Biomim.

Source Item Page Count: 10

Record 4 of 7

Title: A 2D chaotic path planning for mobile robots accomplishing boundary surveillance missions in adversarial conditions

Author(s): Curiac, DI (Curiac, Daniel-Ioan); Volosencu, C (Volosencu, Constantin)

Source: COMMUNICATIONS IN NONLINEAR SCIENCE AND NUMERICAL SIMULATION **Volume:** 19 **Issue:** 10 **Pages:** 3617-3627 **DOI:** 10.1016/j.cnsns.2014.03.020 **Published:** OCT 2014

Times Cited in Web of Science Core Collection: 6

Total Times Cited: 6

Usage Count (Last 180 days): 1

Usage Count (Since 2013): 74

Cited Reference Count: 33

Abstract: The path-planning algorithm represents a crucial issue for every autonomous mobile robot. In normal circumstances a patrol robot will compute an optimal path to ensure its task accomplishment, but in adversarial conditions the problem is getting more complicated. Here, the robot's trajectory needs to be altered into a misleading and unpredictable path to cope with potential opponents. Chaotic systems provide the needed framework for obtaining unpredictable motion in all of the three basic robot surveillance missions: area, points of interests and boundary monitoring. Proficient approaches have been provided for the first two surveillance tasks, but for boundary patrol missions no method has been reported yet. This paper addresses the mentioned research gap by proposing an efficient method, based on chaotic dynamic of the Henon system, to ensure unpredictable boundary patrol on any shape of chosen closed contour. (C) 2014 Elsevier B.V. All rights reserved.

Accession Number: WOS:000335968100019

Language: English

Document Type: Article

Author Keywords: Patrol robot; Boundary surveillance; Adversarial conditions; Chaotic system; Unpredictability

KeyWords Plus: SYSTEMS; FLOW

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Publisher: ELSEVIER SCIENCE BV

Publisher Address: PO BOX 211, 1000 AE AMSTERDAM, NETHERLANDS

Web of Science Categories: Mathematics, Applied; Mathematics, Interdisciplinary Applications; Mechanics; Physics, Fluids & Plasmas; Physics, Mathematical

Research Areas: Mathematics; Mechanics; Physics

IDS Number: AH2RG

ISSN: 1007-5704

eISSN: 1878-7274

29-char Source Abbrev.: COMMUN NONLINEAR SCI

ISO Source Abbrev.: Commun. Nonlinear Sci. Numer. Simul.

Source Item Page Count: 11

Record 5 of 7

Title: Efficiency improvement in multi-sensor wireless network based estimation algorithms for distributed parameter systems with application at the heat transfer

Author(s): Volosencu, C (Volosencu, Constantin); Curiac, DI (Curiac, Daniel-Ioan)

Source: EURASIP JOURNAL ON ADVANCES IN SIGNAL PROCESSING **Article Number:** 4 **DOI:** 10.1186/1687-6180-2013-4 **Published:** 2013

Times Cited in Web of Science Core Collection: 1

Total Times Cited: 1

Usage Count (Last 180 days): 0

Usage Count (Since 2013): 10

Cited Reference Count: 41

Abstract: This paper gives a technical solution to improve the efficiency in multi-sensor wireless network based estimation for distributed parameter systems. A complex structure based on some estimation algorithms, with regression and autoregression, implemented using linear estimators, neural estimators and ANFIS estimators, is developed for this purpose. The three kinds of estimators are working with precision on different parts of the phenomenon characteristic. A comparative study of three methods - linear and nonlinear based on neural networks and adaptive neuro-fuzzy inference system - to implement these algorithms is made. The intelligent wireless sensor networks are taken in consideration as an efficient tool for measurement, data acquisition and communication. They are seen as a "distributed sensor", placed in the desired positions in the measuring field. The algorithms are based on regression using values from adjacent and also on auto-regression using past values from the same sensor. A modelling and simulation for a case study is presented. The quality of estimation is validated using a quadratic criterion. A practical implementation is made using virtual instrumentation. Applications of this complex estimation system are in fault detection and diagnosis of distributed parameter systems and discovery of malicious nodes in wireless sensor networks.

Accession Number: WOS:000316466400001

Language: English

Document Type: Article

Author Keywords: Intelligent sensor networks; Distributed parameter systems; Estimation techniques; System monitoring; Virtual instrumentation

KeyWords Plus: SENSOR NETWORKS; SPECIAL-ISSUE; MODELS

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Publisher: SPRINGER INTERNATIONAL PUBLISHING AG
Publisher Address: GEWERBESTRASSE 11, CHAM, CH-6330, SWITZERLAND
Web of Science Categories: Engineering, Electrical & Electronic
Research Areas: Engineering
IDS Number: 110SQ
ISSN: 1687-6180
29-char Source Abbrev.: EURASIP J ADV SIG PR
ISO Source Abbrev.: EURASIP J. Adv. Signal Process.
Source Item Page Count: 17

Funding:

Funding Agency	Grant Number
CNCSIS-UEFISCSU	PNII-IDEI-PCE-ID923-2009

This work was developed within the frame of PNII-IDEI-PCE-ID923-2009 CNCSIS-UEFISCSU grant.

Record 6 of 7

Title: Ensemble based sensing anomaly detection in wireless sensor networks

Author(s): Curiac, DI (Curiac, Daniel-Ioan); Volosencu, C (Volosencu, Constantin)

Source: EXPERT SYSTEMS WITH APPLICATIONS **Volume:** 39 **Issue:** 10 **Pages:** 9087-9096 **DOI:** 10.1016/j.eswa.2012.02.036 **Published:** AUG 2012

Times Cited in Web of Science Core Collection: 20

Total Times Cited: 20

Usage Count (Last 180 days): 1

Usage Count (Since 2013): 9

Cited Reference Count: 31

Abstract: Wireless sensor networks are often used to monitor and measure physical characteristics from remote and sometimes hostile environments. In these circumstances the sensing data accuracy is a crucial attribute for the way these applications complete their objectives, requiring efficient solutions to discover sensor anomalies. Such solutions are hard to be found mainly because the intricate defining of the correct sensor behavior in a complex and dynamic environment. This paper tackles the sensing anomaly detection from a new perspective by modeling the correct operation of sensors not by one, but by five different dynamical models, acting synergically to provide a reliable solution. Our methodology relies on an ensemble based system composed of a set of diverse binary classifiers, adequately selected, to implement a complex decisional system on network base station. Moreover, every time a sensing anomaly is discovered, our ensemble offers a reliable estimation to replace the erroneous measurement provided by sensor. (C) 2012 Elsevier Ltd. All rights reserved.

Accession Number: WOS:000303281800062

Language: English

Document Type: Article

Author Keywords: Wireless sensor networks; Binary classifier; Ensemble based systems; Sensors anomalies; Data accuracy

KeyWords Plus: ALGORITHMS; DIVERSITY; TREES

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Publisher: PERGAMON-ELSEVIER SCIENCE LTD

Publisher Address: THE BOULEVARD, LANGFORD LANE, KIDLINGTON, OXFORD OX5 1GB, ENGLAND

Web of Science Categories: Computer Science, Artificial Intelligence; Engineering, Electrical & Electronic; Operations Research & Management Science

Research Areas: Computer Science; Engineering; Operations Research & Management Science

IDS Number: 932HR

ISSN: 0957-4174

29-char Source Abbrev.: EXPERT SYST APPL

ISO Source Abbrev.: Expert Syst. Appl.

Source Item Page Count: 10

Record 7 of 7

Title: Chaotic Trajectory Design for Monitoring an Arbitrary Number of Specified Locations Using Points of Interest

Author(s): Curiac, DI (Curiac, Daniel-Ioan); Volosencu, C (Volosencu, Constantin)

Source: MATHEMATICAL PROBLEMS IN ENGINEERING **Article Number:** 940276 **DOI:** 10.1155/2012/940276 **Published:** 2012

Times Cited in Web of Science Core Collection: 2

Total Times Cited: 2

Usage Count (Last 180 days): 0

Usage Count (Since 2013): 15

Cited Reference Count: 46

Abstract: The design of unpredictable trajectories for autonomous patrol robots when accomplishing surveillance missions represents, in many situations, a key desideratum. Solutions to this problem had often been associated with chaotic dynamics. While for area surveillance missions, relevant techniques to produce chaotic motion had been reported, in the case of monitoring a number of precise locations no viable solutions had been proposed. The present paper covers this research gap by offering a complex methodology that involves a mixture of two types of chaotic trajectory segments, based on Lorenz and Chen systems, in obtaining unpredictable trajectories when an arbitrary number of specified locations have to be monitored. The developed path-planning strategy produces trajectories that can cope efficiently with dynamical degradation of chaos or with obstacle avoidance issues.

Accession Number: WOS:000313453200001

Language: English

Document Type: Article

KeyWords Plus: MOBILE ROBOTS; OBSTACLE AVOIDANCE; ENCRYPTION; SYSTEM; ATTRACTOR; CRYPTANALYSIS; ALGORITHM

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Publisher: HINDAWI PUBLISHING CORP

Publisher Address: 315 MADISON AVE 3RD FLR, STE 3070, NEW YORK, NY 10017 USA

Web of Science Categories: Engineering, Multidisciplinary; Mathematics, Interdisciplinary Applications

Research Areas: Engineering; Mathematics

IDS Number: 069RC

ISSN: 1024-123X

eISSN: 1563-5147

29-char Source Abbrev.: MATH PROBL ENG

ISO Source Abbrev.: Math. Probl. Eng.

Source Item Page Count: 18

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