

Editorial

It is our great pleasure to present the current trends in Vision and Robotics to the readers of the journal *Computación y Sistemas*. This volume contains papers related to Computer Vision, Artificial Intelligence, and Neural Networks selected for this thematic issue and several regular papers of the journal.

In the article *Neural Control for a Differential Drive Wheeled Mobile Robot Integrating Stereo Vision Feedback* by Michel Lopez-Franco, Edgar N. Sanchez, Alma Y. Alanis, and Carlos López-Franco, a tracking control method for a differential drive wheeled mobile robot is proposed. The authors use nonholonomic constraints with an inverse optimal neural controller in order to avoid solving the Hamilton Jacobi Bellman equation. They implement an identifier with a discrete-time recurrent high-order neural network trained with an extended Kalman filter algorithm.

The paper *Integration of an Inverse Optimal Neural Controller with Reinforced-SLAM for Path Planning and Mapping in Dynamic Environments* by Alma Y. Alanis, Nancy Arana-Daniel, Carlos Lopez-Franco, and Edgar Guevara-Reyes addresses the topic of optimal neural control. The authors present an artificial intelligence approach for path planning and mapping in dynamic environments for a differential mobile robot. This approach solves the problem of finding a path and creating a map in unknown environments using a neural identifier and inverse optimal control.

A new algorithm for autonomous avatar motion based on the rapidly-exploring Random Tree is proposed in the paper *Autonomous Motion Planning for Avatars Limbs* by Cristian E. Boyain, Goytia Luna, Andres Mendez-Vazquez, and Marco Antonio Ramos-Corchado. The authors calculate the motion sequence for the different avatar limbs, first, using an ontology in which data concerning the avatar structure and the degrees

of freedom is stored and, second, performing a search through possible motions taking into account the structural restrictions of the avatar based on kinesiology studies.

One of the issues in vision and robotics is tackled in the paper *Design and Implementation of an Intelligent System for Controlling a Robotic Hospital Bed for Patient Care Assistance* by Eduardo Vázquez-Santacruz, William Cruz-Santos, and Mariano Gamboa-Zúñiga. The authors propose an intelligent system for automatic movements of a robotics-assisted hospital bed. According to the pressure distribution of a patient on the bed, the proposed system allows a sequence of movements to be programmed in order to prevent bed-sores in patients who stay in bed for extended periods of time.

The paper *Modeling and Pose Control of Robotic Manipulators and Legs using Conformal Geometric Algebra* by O. Carbajal-Espinosa, L. González-Jiménez, J. Oviedo-Barriga, B. Castillo-Toledo, A. Loukianov, and E. Bayro-Corrochano presents a synthesis of the kinematical model of the pose for robot manipulator using a conformal geometric algebra framework. The authors developed two controllers for the position tracking problem and the orientation tracking problem with geometric primitives, such as lines, circles, planes, and spheres.

The authors of the paper *Intelligent Waste Separator* Andres Torres-García, Oscar Rodea-Aragón, Omar Longoria-Gandara, Francisco Sánchez-García, and Luis Enrique González-Jiménez work on alternatives to the traditional methods of waste separation and disposal. They propose an intelligent waste separator that receives the incoming waste and places it automatically into different containers. This work uses a multimedia embedded processor, image

processing, and machine learning to make selection and separation of waste.

The article *Cockpit Design for First Person View Flight for a Remotely Operated Quadrotor Helicopter* by Héctor A. Pérez-Sánchez, Edward U. Benítez-Rendón, Bernardino Castillo-Toledo, Alexander G. Loukianov, Luis F. Luque-Vega, and Maarouf Saad addresses the design and implementation of a cockpit for a remotely operated quadrotor. The authors propose an intuitive graphical user interface for piloting the quadrotor, encompassing the most relevant flight instruments.

A Hardware/Software co-design applied to an image processing application focused on robotic computer vision is presented in the paper *HW/SW Co-Design of a Specific Accelerator for Robotic Computer Vision* by Adrian Pedroza-de la Cruz, Miguel Ángel Carrasco-Díaz, Susana Ortega-Cisneros, Juan José Raygoza-Panduro, Jorge Rivera-Domínguez, and Federico Sandoval-Ibarra. The authors propose a PCIe framework based on the connectivity between an FPGA and the main system processor that allows rapid prototyping of accelerators. The authors present an architecture that enables the co-design of various image processing algorithms, in this case, performing histogram equalization.

The research in the paper *Facial Geometry Identification through Fuzzy Patterns with RGBD Sensor* by Victor Fernández-Cervantes, Arturo García, Marco Antonio Ramos, and Andrés Mendez is done in the field of facial recognition. The authors present an algorithm for recognizing the human face in real time using data acquired by the Microsoft Kinect™ device. The template of the face is based on facial geometry, and the algorithm recognizes patterns/shapes on the point cloud topography. The authors use forensic theory to classify the human face as constant patterns: the cephalometric points, lines, and areas of the face.

The paper *Predicting Software Product Quality: a Systematic Mapping Study* by Sofia Ouhbi, Ali Idri, José Luis Fernández-Alemán, and Ambrosio Toval is dedicated to an analysis of state of the art literature on software product quality prediction. Such analysis is necessary to consider for future studies in the field as it can help researchers and practitioners to select appropriate approaches, tools, evaluation techniques, datasets, and software quality characteristics in order to contribute to this area to a greater degree.

The results obtained in a controlled experiment performed with the objective of comparing the behavior of two well-known testing techniques termed Statement Coverage and All Uses are reported in the paper *All Uses and Statement Coverage: a Controlled Experiment* by Diego Vallespir, Silvana Moreno, Carmen Bogado, and Juliana Herbert. As the authors expected, Statement Coverage turned out to be not as costly as All Uses with respect to execution. The authors perform a detailed analysis of the obtained results.

The role of the human factor is studied in the article *Human Factor Identification in the Tracking Software Process in Academic Environment* by Perla I. Jarillo-Nieto, Carlos Enríquez-Ramírez, and Roberto A. Sánchez-Herrera (this paper is written in Spanish, and its Spanish title is *Identificación del factor humano en el seguimiento de procesos de software en un medio ambiente universitario*). The Five Factor Model was used to implement the processes of software development in a university to evaluate what personality aspects and factors can help or hinder software developers in achieving success in their work.

The authors of the paper *Wikipedia-based Learning Path Generation* Claudia Pérez Martínez, Gabriel López Morteo, Magally Martínez Reyes, and Alexander Gelbukh proposed a novel method of generating learning paths from Wikipedia. This contribution takes

advantage of the existing and accessible database and applies it in a new way which can be useful for designing the instructional process more efficiently.

The paper *Wind Flow Analysis of Twisted Savonius Micro-Turbine Array* by Jesús Antonio Alvarez-Cedillo, Mauricio Olgún-Carbajal, Juan Carlos Herrera-Lozada, Ramón Silva-Ortigoza, and Jacobo Sandoval-Gutiérrez presents a study of wind impact on different geometric configurations of Savonius turbines. Based on the authors' comparative analysis of turbines, a new design proposal was put forward: an array of twisted Savonius micro-turbines which can be implemented with low cost on buildings to generate power.

A deconvolution filter technique implemented with the purpose to learn the internal dynamics of a black-box model with bounded response and

time-invariant evolution is proposed in the paper *Inverse Deconvolution Filter Estimation* (written in Spanish, the Spanish title is *Filtro estimador por deconvolución a través de la inversa*) by C.V. García Mendoza and J.J. Medel Juárez. The novelty of their research is the use of separation by matrix blocks and application of an inverse instead of the state of the art approach in which the pseudoinverse is employed in deconvolution.

This issue will be useful for researchers and students interested in vision and robotics and their numerous applications.

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