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MAINGAP

OPERARIO SENSORIZADO Y ROBÓTICA COLABORATIVA

BOLETÍN DE VIGILANCIA TECNOLÓGICA.
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**XUNTA
DE GALICIA**



CEIIA



Universidade do Minho

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SECCIÓN I. OPERARIO SENSORIZADO

NOTICIAS

01/07/2020

Comau MATE is the first EAWS-certified (Ergonomic Assessment Work-Sheet) exoskeleton

Comau MATE is the first exoskeleton on the market to receive the EAWS (Ergonomic Assessment Work-Sheet) certification, which attests its effectiveness in reducing the “risk of biomechanical overload” of the upper limbs. Based on the evaluation system promoted by Ergo Foundation, Italy’s reference for the organization and measurement of work and ergonomics, the successful recognition studied workers who used MATE to perform daily tasks requiring flexion-extension of the arms.



<https://www.automotiveworld.com/news-releases/comau-mate-is-the-first-ewaws-certified-ergonomic-assessment-work-sheet-exoskeleton/>

20/08/2020

Ekso Bionics® Unveils its Latest Assistive Exoskeleton Innovation for Industrial Use

Ekso Bionics Holdings, Inc, an industry leader in exoskeleton technology for medical and industrial use, today unveiled EVOTM, an endurance-boosting assistive upper body exoskeleton that alleviates the burden of repetitive work. Building on the Company’s trailblazing EksoVest technology, EVO’s innovative design is the next step in the evolution of industrial exoskeletons. Through collaborations with leaders in global manufacturing and construction, Ekso Bionics has accumulated a wealth of in-the-field customer insights that allowed it to reimagine its weight-assist exoskeleton technology.



<https://www.globenewswire.com/news-release/2020/08/20/2081341/0/en/Ekso-Bionics-Unveils-its-Latest-Assistive-Exoskeleton-Innovation-for-Industrial-Use.html>

29/08/2020

Realidad aumentada para simplificar las instalaciones de robots

Descubrir si un robot es adecuado para tu aplicación nunca ha sido tan fácil tras el lanzamiento del nuevo visor de realidad aumentada de ABB, que se ha añadido al potente software de programación offline RobotStudio basado en PC de ABB. La aplicación RobotStudio AR Viewer se puede utilizar para probar cualquier modelo creado en RobotStudio, lo que permite a los usuarios hacerse una idea del tamaño y la escala de un robot o célula y cómo se puede implementar en una fábrica para adaptarse a cualquier equipo de producción existente.



<https://www.infoplcn.net/noticias/item/108296-realidad-aumentada-simplifica-instalaciones-robots-abb>



fdf

01/09/2020

Emerson integra la realidad aumentada al software Plantweb Optics

Emerson ha presentado la tecnología de realidad aumentada (AR) integrada a su plataforma de desempeño de activos Plantweb™ Optics, lo que proporcionará acceso mejorado a los análisis y diagnósticos en tiempo real, así como asistencia remota en directo para los trabajadores de plantas industriales responsables de dar mantenimiento y optimizar los activos de planta. Con la tecnología AR integrada a Plantweb Optics, las compañías pueden mejorar la productividad, colaboración y desempeño operativo, sin estar limitados por la escasez de trabajadores capacitados o restricciones de viaje.



<https://www.infoplcn.net/noticias/item/108212-emerson-integra-realidad-aumentada-software-plantweb-optics>

21/09/2020

BMW Uses Augmented Reality in Vehicle Prototyping

The BMW Group is using a new augmented reality (AR) application in vehicle concept and prototype engineering, speeding up the process by as much as twelve months, from individual vehicle sections through to complex production stages. AR goggles allow real geometries – on a vehicle body, for instance – to be overlaid with true-to-scale holographic 3D models, so a range of concept variants and assembly processes for future series vehicles can be assessed flexibly and cost-efficiently.



<https://metrology.news/bmw-uses-augmented-reality-in-vehicle-prototyping/>

28/09/2020

HoloLens 2 el dispositivo de Realidad Mixta de Microsoft, ya en España

Microsoft ha anunciado en Ignite 2020 la disponibilidad de HoloLens 2 en España, Italia, Holanda, Suiza, Austria, Suecia, Finlandia, Noruega, Dinamarca, Bélgica, Portugal, Polonia, Singapur, Hong Kong y Taiwán. La compañía también ha anunciado un nuevo servicio de realidad mixta llamado Azure Object Anchors -disponible en preview privado- gracias al cual HoloLens 2 puede reconocer un objeto en el mundo real y mapear sus instrucciones relevantes o imágenes sin necesidad del conocimiento de expertos o el uso de códigos de barras para aportar información adicional. Un ejemplo de aplicación es el Microsoft Dynamics 365 Remote Assit, que permite colaborar y resolver problemas en un entorno de realidad mixta compartida.



<http://www.automaticaeinstrumentacion.com/es/notices/2020/09/hololens-2-el-dispositivo-de-realidad-mixta-de-microsoft-ya-esta-disponible-en-espana-47020.php>

PUBLICACIONES CIENTÍFICAS

Julio/2020

Augmented reality: capabilities and challenges in machining industry aligned with industry 4.0

Nadia Abdul Rani, Faieza Abdul Aziz, Abdul Aziz Hairuddin, Siti Azfanizam Ahmad, Abdul Rahman Hermdi

Augmented Reality (AR) currently plays an important role to undertake challenges in integrating technologies to expedite the march towards Industrial Revolution 4.0 (IR 4.0). Therefore, machining industry relies on new design concepts and methods of innovative human-machine interaction application that overlays virtual components on a real-world environment. Nowadays, many potential applications being developed in different fields, from gaming activities to everyday life, education, and industrial sectors. This paper reviews and investigates capabilities of AR as emerging technologies that will improve machining operation to embrace Industry 4.0 (I4.0) for product precision, cost and maintenance.

<https://www.tandfonline.com/doi/abs/10.1080/2374068X.2020.1793269?journalCode=tmp t20&>

Agosto/2020

Virtual hands in VR: motion capture, synthesis, and perception

Sophie Jörg, Yuting Ye, Michael Neff, Franziska Mueller, Victor Zordan

We use our hands every day to interact with our environment and to help us communicate with each other without thinking about it. Wouldn't it be great to be able to do the same in virtual reality? However, accurate hand motions are not trivial to capture. In this course, we present the current state of the art when it comes to virtual hands. Starting with current examples for controlling and depicting hands in virtual reality (VR), we dive into the latest methods and technologies to capture hand motions. As hands can currently not be captured in every situation and as constraints stopping us from intersecting with objects are typically not available in VR, we present research on how to synthesize hand motions and simulate grasping motions.

<https://dl.acm.org/doi/abs/10.1145/3388769.3407494>

Agosto/2020

A Collaborative Augmented Reality Application for Training and Assistance during Shipbuilding Assembly Processes

Aida Vidal-Balea, Oscar Blanco-Novoa, Paula Fraga-Lamas, Miguel Vilar-Montesinos, Tiago M. Fernández-Caramés

This paper presents the development of a novel Microsoft HoloLens collaborative application that allows shipyard operators to interact with a virtual clutch during its assembly in a real Turbine workshop. Such an Augmented Reality (AR) experience acts as a virtual guide while assembling different parts of a ship. In particular, the proposed application allows operators to position the clutch on a real environment and interact with it. The application also provides



information about the documentation of each part of the clutch, showing its blueprints and physical measurements. The proposed AR application enables collaborative AR experiences, allowing users to visualize the same content and animations at the same time and interact simultaneously with 3D objects from multiple devices.

<https://www.mdpi.com/2504-3900/54/1/4>

Septiembre/2020

3DGAM: using 3D gesture and CAD models for training on mixed reality remote collaboration

Peng Wang, Xiaoliang Bai, Mark Billingham, Shusheng Zhang, Sili Wei, Guangyao Xu, Weiping He, Xiangyu Zhang & Jie Zhang

As Virtual Reality (VR), Augmented Reality (AR), Mixed Reality (MR) technology becomes more accessible, it is important to explore VR/AR/MR technologies that can be used for remote collaboration on physical tasks. Previous research has shown that gesture-based interaction is intuitive and expressive for remote collaboration and using 3D CAD models can provide clear instructions for assembly tasks. In this paper, therefore, we describe a new MR remote collaboration system which combines the use of gesture and CAD models in a complementary manner. The prototype system enables a remote expert in VR to provide instructions based on 3D gesture and CAD models (3DGAM) for a local worker who uses AR to see these instructions. Using this interface, we conducted a formal user study to explore the effect of sharing 3D gesture and CAD models in an assembly training task. We found that the combination of 3D gesture and CAD models can improve remote collaboration on an assembly task with respect to the performance time and user experience. Finally, we provide some conclusions and directions for future research.

<https://link.springer.com/article/10.1007/s11042-020-09731-7>



SECCIÓN II. ROBÓTICA COLABORATIVA

NOTICIAS

23/07/2020

Doosan Robotics debuts 6 cobot arms

Way back in November 2019, which seems like a lifetime ago with the COVID-19 pandemic, Doosan Robotics teased its A Series cobot arms at the Korea Machinery Fair. Doosan today finally released details about four cobots in the A Series and another two new cobots in the H Series. Doosan said it will ship the new cobots through its global sales network starting this August. The A Series, which consists of the A0509, A0509s, A0912 and A0912s, offers a payload range of 5kg to 9kg.



<https://www.cobottrends.com/doosan-robotics-debuts-6-cobot-arms/>

13/08/2020

FANUC presenta CRX-10iA, el compañero ideal para el trabajo en fábrica

El departamento de I+D de FANUC ha presentado especial atención a la seguridad. El robot CRX-10iA si colisiona contra un objeto, se aparta automáticamente de él. Los operarios también pueden mover manualmente tres de los ejes del robot para apartarlo de una zona si fuera necesario. El CRX-10ia está certificado según la normativa de seguridad ISO 1218-1. Para que el robot ofrezca la máxima fiabilidad, puede funcionar en modo colaborativo a una velocidad máxima de 1000 milímetros por segundo, así como en modo estándar a una velocidad de hasta 2000 milímetros por segundo.



<https://www.izaro.com/fanuc-presenta-crx-10ia-el-companero-ideal-para-el-trabajo-en-fabrica/c-1597219307/>

17/08/2020

miniPAL cobot palletizer now certified UR+ application kit

miniPAL, a collaborative palletizing robot from North American integrator Columbia/Okura, has been added to the Universal Robots UR+ Applications Program. With this certification, Universal Robots confirms it has tested and approved miniPAL to work with its portfolio of collaborative robots. When powered by the UR10e cobot arm, miniPAL can palletize at two pallet locations for optimized operation. The UR10e cobot arm has a 10kg (22 lb.) payload and 1,300mm (51.1 in.) reach. miniPAL has a footprint of 3.3 x 3.9m (11 x 13 ft.).



<https://www.infoplcn.net/noticias/item/107728-universal-robots-lanza-ur-application-kits-para-cobots>



24/08/2020

OnRobot updates Eyes vision software to facilitate flexible robot applications

OnRobot A/S this month announced an update to its Eyes vision system to offer industrial users greater flexibility than they can get with existing automation. The company said the software update would make collaborative robot arms and autonomous mobile robots easier to implement. The 2.5D camera-based vision system update came in response to customer requests, said OnRobot. The new features enable Eyes to be deployed in quality inspection applications and on mobile robots, according to the company.



<https://www.infopl.net/noticias/item/107909-mitsubishi-assista-sencillez-robotica-colaborativa>

17/09/2020

OnRobot lanza una herramienta de lijado

Las soluciones tradicionales de automatización de lijado implican, a menudo, tener experiencia en robótica para implementarlas y mantenerlas. Ahora, con el lanzamiento de OnRobot Sander, los fabricantes industriales tienen acceso a una herramienta de lijado completamente preconfigurada y fácil de utilizar con los principales robots industriales ligeros y colaborativos. El paquete completo de la Sander incorpora todo lo necesario para poner en marcha la aplicación de lijado de forma rápida y simple: una herramienta de lijado fácil de conectar, una variedad de almohadillas estándar de lijado y pulido, un software de programación sencillo, un sensor opcional de fuerza/torsión y un Grit Changer que permite el cambio automático entre diferentes granos de lijado sin la intervención del operario.



<https://www.infopl.net/noticias/item/108387-onrobot-herramienta-robotica-lijado>

PUBLICACIONES CIENTÍFICAS

Julio/2020

Mastering the working sequence in human-robot collaborative assembly based on reinforcement learning

Tian Yu, Jing Huang, Qing Chang

A long-standing goal of the Human-Robot Collaboration (HRC) in manufacturing systems is to increase the collaborative working efficiency. In line with the trend of Industry 4.0 to build up the smart manufacturing system, the Co-robot in the HRC system deserves better designing to be more self-organized and to find the superhuman proficiency by self-learning. Inspired by the impressive machine learning algorithms developed by Google Deep Mind like Alphago Zero, in this paper, the human-robot collaborative assembly working process is formatted into a chessboard and the selection of moves in the chessboard is used to analogize the decision



making by both human and robot in the HRC assembly working process. To obtain the optimal policy of working sequence to maximize the working efficiency, the robot is trained with a self-play algorithm based on reinforcement learning, without guidance or domain knowledge.

<https://arxiv.org/abs/2007.04140>

Agosto/2020

Haptic-based touch detection for collaborative robots in welding applications

Michael Tannous, Marco Miraglia, Francesco Inglese, Luca Giorgini, Filippo Ricciardi, Riccardo Pelliccia, Mario Milazzo, Cesare Stefanini

In the Industry 4.0 scenario, collaborative robots have been strongly employed for complex processes and customized production activities. Interaction-based technologies have characterized this approach assisting the operator in several process workflows. In this paper, a haptic-based touch detection strategy is described and tested to assist, in real-time, the operator using a collaborative system in a real industrial scenario, namely the welding process. To assess the performance, two main criteria were analyzed: the 3-Sigma rule and the Hampel identifier. Experimental results showed better performance of the 3-Sigma rule in terms of precision percentage (mean value of 99.9%) and miss rate (mean value of 10%) with respect to the Hampel identifier. Results confirmed the influence of the contamination level related to the dataset. This algorithm adds significant advances to enable the use of light and simple machine learning approaches in real-time applications.

<https://www.sciencedirect.com/science/article/abs/pii/S0736584519302200>

Agosto/2020

Framework for Identifying Gripper Requirements for Collaborative Robot Applications in Manufacturing

Omkar Salunkhe, Patrik Fager, Åsa Fast-Berglund

Robots designed for collaborative applications based on the interaction between human operators are on the rise in the industry. With the involvement of humans, special consideration should be given to select the end effector of cobot generally referred to as grippers. This paper presents a framework for the identification of gripper requirements in a systematic way. The paper first provides general information on DFAA analysis and task allocation methods used in the framework. Different levels of interaction and gripper principles are also presented. Scenarios for varying levels of interaction are presented, followed by the framework to identify gripper requirements with an explanation for each step in the framework.

https://link.springer.com/chapter/10.1007/978-3-030-57993-7_74

Septiembre/2020

Design of an Additively Manufactured Customized Gripper System for Human Robot Collaboration

Nikolai Hangst, Stefan Junk, Thomas Wendt

The Human-Robot-Collaboration (HRC) has developed rapidly in recent years with the help of collaborative lightweight robots. An important prerequisite for HRC is a safe gripper system. This results in a new field of application in robotics, which spreads mainly in supporting activities in the assembly and in the care. Currently, there are a variety of grippers that show



recognizable weaknesses in terms of flexibility, weight, safety and price. By means of Additive manufacturing (AM) gripper systems can be developed which can be used multifunctionally, manufactured quickly and customized. In addition, the subsequent assembly effort can be reduced due to the integration of several components to a complex component. An important advantage of AM is the new freedom in designing products.

https://link.springer.com/chapter/10.1007/978-3-030-54334-1_29

SECCIÓN III. EVENTOS INDUSTRIA 4.0



WeRob 2020

13-16 octubre 2020, Conferencia Virtual

WeRob 2020 and WearRACon Europe 2020 are proud to collaborate this year to create a premier European conference on wearable robotics for both the medical and industrial sectors. Researchers and innovators from all around the world will discuss novel approaches, challenges and potential solutions in technologies for wearable robots. The symposium will enclose presentations and discussions in various fields such as: supporting solutions for healthy ageing, advanced therapeutic treatments of neurological diseases, space applications or assistive technologies in the industry.

<http://www.2020.werob.org/>



AI & Big Data Congress

14-15 octubre 2020, Barcelona (España)

AI & Big Data Congress es el congreso de referencia sobre Inteligencia Artificial y la explotación de grandes volúmenes de datos que se celebrará el día 14 de octubre en Barcelona. El congreso contará con expertos de nivel nacional e internacional que mostrarán las tendencias, retos, novedades y casos de éxito innovadores en el ámbito de la AI y el Big Data. El Call for projects está dirigido a organizaciones que hayan desarrollado o adoptado soluciones innovadoras basadas en Inteligencia Artificial o Big Data y que puedan demostrar su impacto.

<https://aicongress.barcelona/es/>





Connected Factories Webinar

20 octubre 2020, Webinar

The webinar on Standards for digital manufacturing is organised in association with the ConnectedFactories Coordination and Support Action on Tuesday 20 October 2020 from 9:30 to 12:30 CEST. The Webinar will focus on use cases and best practices that illustrate how standards are used in research & innovation on digital manufacturing. Special attention will be dedicated to the added value as well as gaps and needs. Please note that a national/regional ConnectedFactories online workshop on standardisation will be organised by Fraunhofer IPA and S2i for a German-speaking audience on 16 October 2020.

[Link](#)



IndTech2020

27-28 octubre 2020, Conferencia virtual

IndTech2020 provides a platform for stakeholders from research organisations, industry and policy-making to discuss future trends, technological challenges and the further steps required in order to shape and strengthen future European industrial and research policy in the field of key enabling technologies such as nanotechnologies, advanced materials, biotechnology and advanced manufacturing under the considerations of socially fair transition to a sustainable and green economy. Furthermore, the impacts and positive effects by 2030 and 2050 of the presented technologies and processes will be considered and discussed.

<https://www.indtech2020.eu/home>

