COMMANDIA NEWSLETTER

http://commandia.unizar.es

Collaborative Robotic Mobile Manipulation of Deformable Objects in Industrial Applications

May 18, 2020

COMMANDIA workshop at IROS'20

A workshop of COMMANDIA project is in preparation to be held at the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) at The Caesars Forum Convention Center, Las Vegas, USA, October 25-29, 2020. The workshop is entitled ROMADO: RObotic MAnipulation of Deformable Objects. More details can be found at the workshop page of ROMADO.

May 25, 2020

COMMANDIA meeting

The advances of project were presented by teleconference in the meeting of the COMMANDIA consortium on May 22, 2020. Some snapshots of the presentations can be seen is the following image:
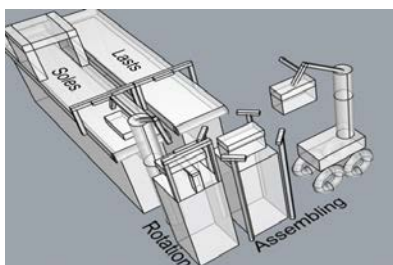
May 30, 2020

SIGMA Clermont at ICRA 2020

Partner Institut Pascal of project COMMANDIA is participating in a virtual booth at ICRA 2020.

You can see in the following the information about the project in the virtual booth about COMMANDIA and our goals: Development of a mobile manipulator team that will handle deformable components of footwear in order to assemble shoes in industrial environments. Real-time deformation tracking based on multi-camera RGBD systems. Grasp synthesis for stable manipulation of soles, fabrics and other components of footwear.

Deformation control of soft components by the manipulation with multi-arm robotic systems, Multi-robot coordination strategies for active perception and collaborative transportation tasks.

Application to a real demonstrator chosen by industrial partners. This research project (SOE2/P1/F0638) is funded by the Interreg Sudoe Programme and FEDER. More information here.

Institut Pascal will also answer any questions of the attendants by the Slack channel inside ICRA2020:

1. You need to register to the general workspace Slack of the conference.
2. When you log in the ICRA Slack, you need to click in the left menu to add the channel of Institut Pascal. You can search by the name of Institut Pascal or you can add the direct link.

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June 9, 2020

Paper: Blind Manipulation of Deformable Objects Based on Force Sensing and Finite Element Modeling
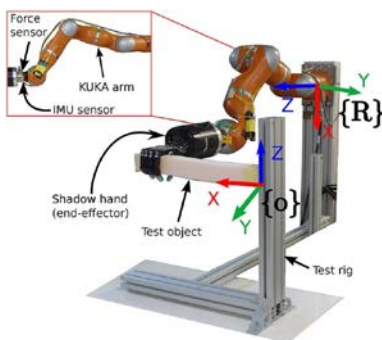
Title: Blind Manipulation of Deformable Objects Based on Force Sensing and Finite Element Modeling

Author: Jose Sanchez, Kamal Mohy El Dine, Juan Antonio Corrales, Belhassen-Chedli Bouzgarrou and Youcef Mezouar

Journal: Frontiers in Robotics and AI. 09 June 2020. 7:73. doi: 10.3389/frobt.2020.00073

Abstract: In this paper, we present a novel pipeline to simultaneously estimate and manipulate the deformation of an object using only force sensing and an FEM model. The pipeline is composed of a sensor model, a deformation model and a pose controller. The sensor model computes the contact forces that are used as input to the deformation model which updates the volumetric mesh of a manipulated object. The controller then deforms the object such that a given pose on the mesh reaches a desired pose. The proposed approach is thoroughly evaluated in real experiments using a robot manipulator and a force-torque sensor to show its accuracy in estimating and manipulating deformations without the use of vision sensors. Download paper
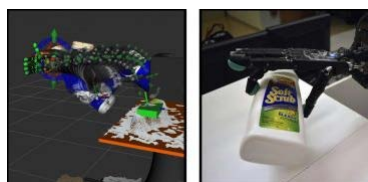
June 23, 2020

PhD Thesis: Robotic manipulation based on visual and tactile perception
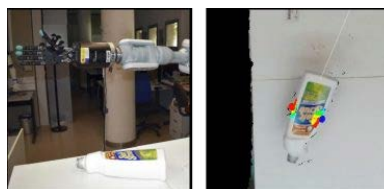
Brayan Stiven Zapata Impata (University of Alicante, Linkedin) is going to defend his PhD Thesis on the topics of COMMANDIA under the supervision of Professor Pablo Gil. The dissertation is planned on September, 17th, 2020 in Alicante, Spain.


Author: Brayan Stiven Zapata Impata

Supervisor: Pablo Gil Vazquez

Dissertation date: September 17th, 2020.

Title: Robotic manipulation based on visual and tactile perception. Abstract: In this thesis, we provide solutions for various challenges in robotic manipulation. Applying visual perception, a robotic assistant could find grasps on unknown objects. With the use of tactile perception, the robot could predict whether the grasp is stable and even identify in which direction might be slipping the grasped object.

As a result, the robot could trigger strategies for keeping the object stable. Finally, integrating our tactile data generation system with the rest of the modules, the assistive robot could feel the grasps before actually moving itself, so less objects would be dropped due to visually stable grasps that are actually slippery.
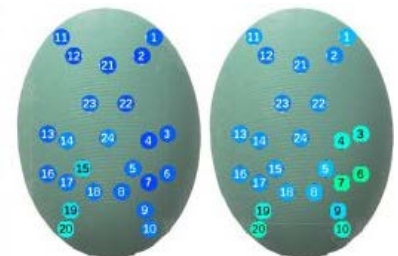
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Collaborative Robotic Mobile Manipulation of Deformable Objects in Industrial Applications
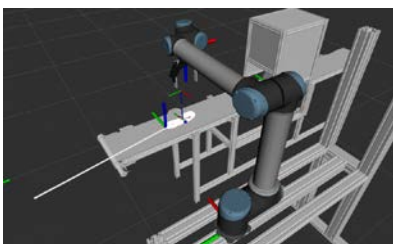
June 23, 2020

Paper: Robotic workcell for sole grasping in footwear manufacturing
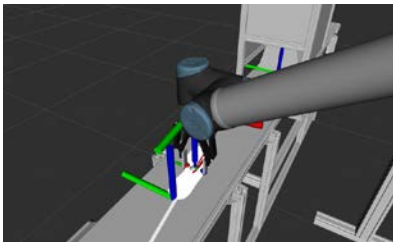
Title: Robotic workcell for sole grasping in footwear manufacturing

Author: Guillermo Oliver, Pablo Gil, Fernando Torres

Conference: 25th Int. Conf. on Emerging Technologies and Factory Automation (ETFA), Vienna (Austria), 8-11 September 2020.

Abstract: The goal of this paper is to present a robotic workcell to automate several tasks of the cementing process in footwear manufacturing.

Our cell's main applications are sole digitization of a wide variety of footwear, glue dispensing and sole grasping from conveyor belts. This cell is made up of a manipulator arm endowed with a gripper, a conveyor belt and a 3D scanner.

We have integrated all the elements into a ROS simulation environment facilitating control and communication among them, also providing flexibility to support future extensions.

We propose a novel method to grasp soles of different shape, size and material, exploiting the particular characteristics of these objects. Our method relies on object contour extraction using concave hulls.

We evaluate it on point clouds of 16 digitized real soles in three different scenarios: concave hull, k-NNs extension and PCA correction.

While we have tested this workcell in a simulated environment, the presented system's performance is scheduled to be tested on a real setup at INESCOP facilities in the upcoming months.
Paper at IEEE

July 14, 2020

COMMANDIA video with recent results

The following video, made by Ignacio Cuiral-Zueco, presents a summary of recent results of project COMMANDIA (Download)

August 1, 2020

Paper: RGB-D tracking and optimal perception of deformable objects

Title: RGB-D tracking and optimal perception of deformable objects

Author: Ignacio Cuiral-Zueco, Gonzalo López-Nicolás

Journal: IEEE Access, vol. 8, pp. 136884-136897, 2020.

Collaborative Robotic Mobile Manipulation of Deformable Objects in Industrial Applications

Abstract: Addressing the perception problem of texture-less objects that undergo large deformations and movements, this article presents a novel RGB-D learning-free deformable object tracker in combination with a camera position optimisation system for optimal deformable object perception.

The approach is based on the discretisation of the object's visible area through the generation of a supervoxel graph that allows weighting new supervoxel candidates between object states over time.

Once a deformation state of the object is determined, supervoxels of its associated graph serve as input for the camera position optimisation problem.

 Satisfactory results have been obtained in real time with a variety of objects that present different deformation characteristics.

Download paper