Editor's Note:
It is our pleasure to bring you the most recent newsletter of the Technical Committee on Mobile Manipulation. The newsletter is a brief snapshot of the ongoing projects and opportunities in the area. If you would like your announcement to appear in the next newsletter, or you have some suggestion/comment for the TC, please do not hesitate to contact one of the co-chairs: Dmitry Berenson (dberenson@cs.wpi.edu), Wes Huang (wes.huang@alumni.cmu.edu), or Máximo Roa (maximo.roa@dlr.de).
Don't forget to use our webpage, http://mobilemanipulation.org/ to follow the most recent information from the TC. Also, feel free to join the TC on:
Linkedin: http://www.linkedin.com/groups/IEEE-RAS-Technical-Committee-on-6591574?home=&gid=6591574&trk=anet_ug_hm
Facebook: https://www.facebook.com/groups/246281928815732/
Mailing list: http://mobilemanipulation.org/index.php/contact
And don't hesitate to use these channels to announce your results, workshops, videos, code releases and news of potential interest to the community.
Thanks to all the contributors of this issue!

Technical Committee on Mobile Manipulation Newsletter (September 2015)

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1. NEW ROBOT VIDEOS

First Results of the project BesMan (Behaviours for mobile manipulation):
The video shows the first results of the project BesMan uses the DFKI's robot AILA. The robot autonomously executes a given high-level action plan in order to perform some operations on a mockup of the International Space Station (ISS). On the one side, a software framework and an accompanying embedded domain specific language (eDSL) have been developed to describe and control robot manipulation behaviors and keep their descriptions (and the descriptions of the tasks) independent of a particular robot. Thus, the same robot high-level behaviour can be re-used on robots of different morphology and/or hardware. On the other side, a whole-body reactive control approach is used in order to automatically find an optimal usage all the available degrees of freedom at runtime.
http://robotik.dfki-bremen.de/fileadmin/content/ric/media/videos/20150903_AILA_ISS_Demo_kurze_Version_web.mp4
(Thanks to Jose de Gea – DFKI)

Bimanual pin insertion
First step in the automatic assembly of an IKEA chair : pin insertion. We integrated optical motion capture, motion/grasp planning and force control to achieve this highly dexterous task. For more details, see our paper "A framework for fine robotic assembly" in http://arxiv.org/abs/1509.04806.
http://www.ntu.edu.sg/home/cuong/videos.html

(Thanks to Quang-Cuong Pham – NTU Singapore)

ARCAS aerial robotics manipulation project
The ARCAS youtube channel (https://www.youtube.com/user/ARCASProject) links several videos of the FP7 ARCAS (AErial Robotics Cooperative Assembly System) project. This channel includes a video with a summary of experiments performed in the third year of the project
https://www.youtube.com/watch?v=-rIEBWrtHkc ,
and a video devoted to the program of ARCAS in Euronews with interviews and demonstrations
https://www.youtube.com/watch?v=DsUiAGelj7Q
(Thanks to Anibal Ollero – U. Sevilla)

HoLLiE as barkeeper in Berlin
Recently we had the opportunity to present our Bimanual Mobile Manipulation Robot HoLLiE on the "Stallwächter Party", a huge political event in Berlin. For that reason we developed Barkeeper skills for HoLLiE and were able to hand out 280 cocktails on one evening with the robot!
https://www.youtube.com/watch?v=9QGIvrar0gg
(Thanks to Andreas Hermann – FZI)

Team RBO – TU Berlin, Winner of the Amazon Picking Challenge
Team RBO of the Robotics & Biology lab at TU Berlin won the Amazon Picking Challenge 2015 (http://amazonpickingchallenge.org) using a mobile manipulator. The challenge required teams to segment, pick, and place 12 out of 25 known objects from a shelf. The mobility of the base was crucial for the team's success because it allowed the robot to access all bins and reach good viewing angles easily.
You can see the winning run here:
https://www.youtube.com/watch?v=DuFtwpxQnFI
(Thanks to Roberto Martín-Martín, TU Berlin)

Improving Robot Dexterity
https://www.youtube.com/watch?v=ZiqC9emBk00
MIT engineers have devised a way to give more dexterity to simple robotic grippers using the environment as a helping hand. Their model predicts the force with which a robotic gripper must push against surrounding fixtures in order to adjust its grasp. (Learn more about the system: http://mitne.ws/1ONlwzt)
(Thanks to Alberto Rodríguez – MIT)

Amazon Picking Challenge
B-roll of the teams participating in the Amazon Picking Challenge
https://kiva.wistia.com/medias/vc30xovahl

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2. NEW PROJECT WEBSITES

SOMA: Soft Manipulation
http://softmanipulation.eu/
SOMA (H2020 project) is the key for the development of simple, compliant, yet strong, robust, and easy-to-program manipulation systems. SOMA explores a new avenue of robotic manipulation, exploiting the physical constraints imposed by the environment to enable robust grasping and manipulation in dynamic, open, and highly variable contexts

COMANOID: Multi-Contact Collaborative Humanoids in Aircraft Manufacturing
http://comanoid.cnrs.fr/
COMANOID (H2020 project) aims at deploying humanoid robots to achieve non-added value tasks that have been identified by Airbus Group in aircraft assembly operations. The project focuses on showing precise accessibility (namely into areas where wheeled robots cannot be deployed) through whole body multi-contact planning motion with advanced embedded 3D dense SLAM localization and visuo-force servoing capabilities. Because the robots evolve in human worker co-localized spaces, safety issues will be specifically accounted for. The results of COMANOID will be showcased in a 1:1 scale demonstrator of a real aircraft using two humanoid robots: the HRP-4 position controlled humanoid robot provided by CNRS, and the TORO torque controlled humanoid robot provided by DLR.

ARCAS: AErial Robotics Cooperative Assembly System
The Web site http://www.arcas-project includes general information of the ARCAS aerial manipulation project. The ARCAS project proposes the development and experimental validation of the first cooperative free-flying robot system for assembly and structure construction. The web site includes publications and videos of the project.
(Thanks to Anibal Ollero (coordinator) – U. Sevilla)

AEROARMS: AErial RObotic system integrating multiple ARMS and advanced manipulation capabilities for inspection and maintenance
Last June 1st started the H2020 AEROARMS. The recently opened Web site of the project is in http://www.aeroarms-project.eu/. The challenging objective of AEROARMs is the development of the first first aerial robots with multiple articulated arms and advanced manipulation capabilities for the application in industrial inspection and maintenance. The project involve the demonstration in oil and gas industries.
(Thanks to Anibal Ollero (coordinator) – U. Sevilla)

IN-SITU FABRICATOR
http://www.dfab.ch/achievements/the-in-situ-fabricator-an-autonomous-construction-robot/
The “In situ Fabricator” (IF) is a mobile construction robot, which in future shall be able to autonomously complete building tasks directly on construction sites. In order to achieve this, the robot is currently being equipped with all components necessary to autonomously drive, reposition itself and handle building materials, on-board. By enabling the implementation of digital fabrication beyond factory settings, the IF has the potential to close the process chain between architectural design and making.
The IF is part of the National Centre of Competence in Research (NCCR) Digital Fabrication (National Centre of Competence in Research (NCCR) Digital Fabrication). Based at ETH Zurich this broadly supported research initiative combines the disciplines of architecture, structural engineering, robotics, material and computer science. The long-term goal is to seamlessly combine digital technologies with the physical construction process.
(Thanks to Lüthi Sonja – ETH)

BESMAN: Behaviours for mobile manipulation
The main goal of the project BesMan is the development of one- and two-arm manipulation procedures as well as the learning of new situation-specific behaviors by means of a machine learning platform. Although many situations can be mastered by using reflexive behaviors, the automatic generation of complex goal-directed behavior cannot be accomplished in this way. It is therefore reasonable that the robotic system incorporates an interface to a human operator, who via demonstration will show the robot how to deal with hazardous or unforeseen situations which the robot could not solve autonomously by simply using reflexive actions.

Funded by the German Space Agency (DLR Agentur) with federal funds of the German Federal Ministry of Economics and Technology, Grant Nr. 50 RA 1216 and 50 RA 1217.
http://robotik.dfki-bremen.de/en/research/projects/besman.html
(Thanks to Jose de Gea – DFKI)

Graph Based Inverse Optimal Control for Robot Manipulation
This project explores an approach for teaching manipulation tasks to robots using human kinesthetic demonstrations. Given multiple demonstrations of a specific task (eg. carrying a cup of water without spilling), we apply Inverse Optimal Control (IOC) techniques to learn a cost function that characterizes the task. We then apply local trajectory optimization methods on the learned cost function to generate trajectories that satisfy the task, with strong generalization. We show results from testing the system on two 7-DOF robot arms performing tabletop manipulation tasks.
http://rse-lab.cs.washington.edu/projects/graph-based-ioc/
(Thanks to Arunkumar Byravan – U. Washington)

THE CARLoS PROJECT
http://carlosproject.eu/
The CARLoS project aims to apply recent advances in cooperative mobile robotics, to a representative industrial scenario in shipyards. CARLoS robot will be built using off-the-shelf technology under a modular approach. The final prototype will be demonstrated as a robot co-worker for fit-out operations inside blocks of ship superstructures. Currently, there is no automated solution to these tasks.
(Thanks to Javier Pérez Toledo – Robotnik)

ROBO-SPECT: Robotic System with Intelligent Vision and Control for Tunnel Structural Inspection and Evaluation
http://www.robo-spect.eu/
ROBO-SPECT, driven by the tunnel inspection industry, adapts and integrates recent research results in intelligent control in robotics, computer vision tailored with semisupervised and active continuous learning and sensing, in an innovative, integrated, robotic system that automatically scans the intrados for potential defects on the surface and detects and measures radial deformation in the cross-section, distance between parallel cracks, cracks and open joints that impact tunnel stability, with mm accuracies. This permits, in one pass, both the inspection and structural assessment of tunnels. Intelligent control and robotics tools are interwoven to set an automatic robotic arm manipulation and an autonomous vehicle navigation so as to minimize humans' interaction. This way, the structural condition and safety of a tunnel is assessed automatically, reliably and speedily.
(Thanks to Javier Pérez Toledo – Robotnik)

EUROC: European Robotic Challenges
http://www.euroc-project.eu/index.php?id=challengers
Out of 102 teams that participated in the simulation contest, only 15 advanced to Stage II of the contest. In the webpage you will find the description of the teams that advanced to the next round, with the description of their use cases.

Project DREAM: Deferred Restructuring of Experience in Autonomous Machines
http://www.robotsthatdream.eu/
DREAM is a robotic project that incorporates sleep and dream-like processes within cognitive architecture. This enables an individual robot or groups of robots to consolidate their experience into more useful and generic formats, thus improving their future ability to learn and adapt. DREAM relies on Evolutionary Neurodynamic ensemble methods as a unifying principle for discovery, optimization, re-structuring and consolidation of knowledge. This new paradigm will make the robot more autonomous in its acquisition, organization and use of knowledge and skills just as long as they comply with the satisfaction of pre-established basic motivations.

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3. NEW CODE RELEASES

HAF_Grasping package available for ROS
This package calculates grasps for unknown and known objects represented by object point cloud data using Height Accumulated Features (HAF). Evaluation and foundation can be found in ''D. Fischinger, A. Weiss, M. Vincze: "Learning Grasps with Topographic Features", The International Journal of Robotics Research. (2015)''

A description of the package and an easy HowToStart is available here:
http://wiki.ros.org/haf_grasping
Contact: david.fischinger at gmail.com
(Thanks to David Fischinger – TU Wien)

Release of the Rutgers APC RGB-D Dataset
The PRACSYS lab at Rutgers University is releasing a large-scale RGB-D dataset related to the Amazon Picking Challenge (APC). The objective is to assist in the evaluation of pose estimation methods in the context of warehouse picking. The dataset contains more than 10K RGB-D images for 24 APC objects at different poses, bin locations and from different viewpoints. The dataset allows researchers & teams to evaluate the effects of clutter by presenting the same object/pose combination in a single-item, double-item and multi-item bins. For all these images, ground truth 6DOF poses are provided and YAML files containing the relevant transformation matrices. We are also releasing a set of 25 APC object models for use with the dataset. Data collection was performed using a Microsoft Kinect v.1 camera mounted to the last joint of a Yaskawa Motoman SDA10F's arm and objects were placed in an Amazon shelving unit.
Download page: http://pracsyslab.org/rutgers_apc_rgbd_dataset
Related report available on ArXiv: http://arxiv.org/abs/1509.01277
(Thanks to Kostas Bekris - Rutgers University)

Release of a Large-Scale Robotic Grasping Database
http://grasp-database.dkappler.de/
The database provides grasps that are applied to more than 700 distinct objects from over 80 categories. These grasps are generated in simulation and evaluated using the standard epsilon-metric and a new physics-metric. In crowd-sourcing experiments, we have confirmed that the proposed physics-metric is a more consistent predictor for grasp success than the epsilon-metric. In total, the database provides around 500.000 labelled grasp each annotated with stability labels from these different metrics. Additionally, we simulate noisy and incomplete perception of objects from different viewpoints using a realistic model of an RGB-D camera. This allows us to additionally link representations of local object shape to each grasp. This database provides a very interesting dataset for learning how to grasp with techniques that can leverage big data.
For more detailed information, please refer to “Leveraging Big Data for Grasp Planning”, D. Kappler. J. Bohg, S. Schaal, ICRA’15.
(Thanks to Jeannette Bohg – MPI)

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4. UPCOMING WORKSHOPS

If you are attending IROS, you might be interested in the following workshops:
Robotic co-workers: methods, challenges and industrial test cases, Sept. 28
http://home.deib.polimi.it/zanchettin/IROS2015/
Cognitive Mobility Assistance Robots: Scientific Advances and Perspectives, Sept 28
http://robotics.ntua.gr/IROS2015-Workshop-Cognitive-Mobility-Assistance/
Cooperative vehicles and robotic systems for industrial applications, Sept 28
http://multirob-iros15.sciencesconf.org/
Task Planning for Intelligent Robots in Service and Manufacturing, Oct 2nd
http://www6.in.tum.de/Main/WorkshopIros2015TaskPlanning
Transfer of Cognitive Robotics Research to Industrial Assembly and Service Robots, Oct 2nd
http://caro.sdu.dk/iros15-workshop-cognitive-transfer/
Safety for Human-Robot interaction in Industrial Settings, Oct 2nd
http://fourbythree.eu/iros2015/
Physical Human-Robot Collaboration: Safety, Control, Learning and Applications, Oct 2nd
http://www.idiap.ch/workshop/ws-iros2015/
Machine Learning in Planning and Control of Robot Motion, Oct 2nd
http://kormushev.com/MLPC-2015/

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5. POSITIONS

Virginia Tech Robotics And Mechatronics Lab
Ph.D. Positions in Robotics at Virginia Tech Robotics and Mechatronics Laboratory, Blacksburg, VA
Sample research topics include, but are not limited to:
• Autonomous mobile robots with symbiosis of mobility and manipulation and modular & reconfigurable mobile robotics for search & rescue and hazardous environment sensing
• Design of intelligent biomimetic robotic tails for robust dynamic stabilization and agile maneuvering of legged robots on rough terrain
• Development and testing of co-operative scalable field robots for casualty extraction and evacuation in hazardous environments
• Haptics devices and upper-extremity exoskeletons for robot control and rehabilitation therapy
• Autonomous unmanned aerial vehicle (UAV) launch and recovery from naval vessels, and wireless telemetry systems for remote sensing and monitoring in naval applications
More information: http://www.rmlab.org/positions.php
(Thanks to Pinhas Ben-Tzvi – Virginia Tech)

Research Assistant and PhD Studentship at Bristol Robotics Lab
A one year Research Assistant position (UK/international applicants) and a 3.5 year fully funded PhD scholarship (UK applicants only) are available in Tactile Robotics at the University of Bristol.
RA positon:
http://www.bristol.ac.uk/jobs/find/details.html?nPostingID=3765&nPostingTargetID=13782&option=28&sort=DESC&respnr=1&ID=Q50FK026203F3VBQBV7V77V83&keywords=tactile&Resultsperpage=10&lg=UK&mask=uobext

Tenure Track Faculty positions – WPI
Research areas of interest include, but are not limited to: Fundamentals (e.g. Controls, Learning, Perception), Capabilities (e.g. Human-Robot Interaction, Manipulation, Mobility), and Applications (e.g. Environment, Health, Manufacturing).

http://www.wpi.edu/academics/robotics/

Stanford University Faculty Openings in Robotics
1. School of Engineering robotics faculty search:
http://ee.stanford.edu/job-openings#robotics
2. Mechanical Engineering faculty search, with special emphasis on controls, robotics, manufacturing, and biomedical engineering:
https://me.stanford.edu/sites/default/files/search_ad_-_broad_search_mewebsite_0.pdf

Lecturer/Senior Lecturer at U. Lincoln
We seek to appoint a permanent Lecturer or Senior Lecturer with established research expertise in Robotics and Autonomous Systems or a related field.
https://jobs.lincoln.ac.uk/

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6. ANNOUNCEMENTS

Robotiq releases a new adaptive robot gripper, 2-finger 140
http://robotiq.com/products/adaptive-robot-gripper-2-finger-140/?utm_source=newsletter&utm_medium=email&utm_campaign=09-2015-newsletter-leads
Robotiq released the 2 Finger 140 Adaptive Robot Gripper, a large stroke electric gripper, with a 140 mm programmable stroke and a 2 kg payload, ideal for high-mix pick and place operations for various industries such as electronics, consumer goods and logistics.

Tiago, Mobile Manipulator by PAL Robotics
http://www.tiago.pal-robotics.com/en/
(Meet it at IROS)

Fetch and Freight, bit Fetch Robotics
http://fetchrobotics.com/fetchandfreight/

New robots by Robotnik
Mobile manipulator RB-1
http://www.robotnik.eu/manipulators/rb-one/
Mobile manipulator XL-MICO
http://www.robotnik.eu/manipulators/xl-mico/
(Thanks to Javier Pérez Toledo – Robotnik)

KUKA Innovation Award 2016
http://www.kuka-ag.de/de/sectors_innovations/innovations/
Applicants for the Award have to demonstrate an innovative robotic application targeting flexible manufacturing. To ensure a fair and direct comparison of the innovations, the developed robotic application shall be demonstrated on the KUKA LBR iiwa and shall operate in a realistic working environment with human coworkers.
The Award application must be submitted by October 16, 2015