Intelligent and Interactive Systems

Making robots learn to perceive and act with understanding

At IIS we enable autonomous robots to perceive and act flexibly and robustly in unstructured environments, leveraging machine learning methods to build perceptual, motor and reasoning skills.

We seek to answer the question: *How can we enable robots to acquire the knowledge and understanding they require to interact sensibly with unstructured environments?*

Our research addresses complete perception-action loops, from computer vision to grasping and manipulation, using reactive algorithms and/or cognitive models. Much of our work uses machine learning to enable robots to synthesize and improve complex and robust sensorimotor behavior with experience. Related areas of interest include human-robot interaction, image and video analysis, and visual neuroscience.

Working With Us

Check our thesis topics for Bachelor and Master students.

News

- Justus Piater is an **invited speaker** at the workshop on Machine Learning Methods for High-Level Cognitive Capabilities in Robotics at IROS in October 2016.
- Justus Piater is an **invited speaker** at the workshop on Robot-Environment Interaction for Perception and Manipulation at RSS in June 2016.
- Emre Ugur is an **invited speakers** at the workshop on Bootstrapping Manipulation Skills at RSS in June 2016.
- Emre Ugur is co-organizing **Shonan Meeting** on Cognitive Development and Symbol Emergence in Humans and Robots, with Tadahiro Taniguchi and George Konidaris, in October 2016, in Japan.
- Emre Ugur is an **invited speaker** at the 2nd International Workshop on Cognitive Neuroscience Robotics in February 2016, in Osaka, Japan.
- Emre Ugur is guest editor of the Special Issue on Computational Models of Affordances for Cognitive Robots in the IEEE Transactions on Cognitive and Developmental Systems.
- Justus Piater is an **invited speaker** at the 1st International Workshop on Recovering 6D Object Pose, at ICCV in December 2015.
- Antonio Rodriguez-Sanchez is organizing, jointly with George Azzopardi (Univ. Malta) a BICT workshop on Computer Models of the Visual Cortex, to be held in New York in December.
- Justus Piater is co-organizing **Dagstuhl Seminar** 15411 on Multimodal Manipulation Under Uncertainty in October 2015.
- Justus Piater is an **invited speaker** at the workshop on Learning Object Affordances: A fundamental step to allow prediction, planning and tool use in autonomous robots, at IROS in September 2015.
- Emre Ugur is co-organizing, with Lorenzo Jamone, Angelo Cangelosi, Tamim Asfour, and Jose Santos-Victor, a workshop on Learning Object Affordances: A fundamental step to allow

prediction, planning and tool use in autonomous robots, at IROS in October 2015.
- Justus Piater is an **invited speaker** at the workshop on Robot Learning, Bottom-up and top-down development of robot skills at ICAR in July 2015.
- Emre Ugur is organizing, with Lorenzo Jamone, Yukie Nagai, and Erhan Oztop, a workshop on Robot Learning, Bottom-up and top-down development of robot skills at ICAR in July 2015.
- Emre Ugur is an **invited speaker** at the workshop on Learning Reusable Concepts in Robotics at RSS in July 2015.
- Justus Piater is organizing, with Tamim Asfour (KIT), the workshop on Learning Reusable Concepts in Robotics at RSS in July 2015. Check our exciting lineup of invited speakers!
- Our following paper won the **Best Robotic Vision Paper Award** at CRV 2015:
  Safoura Rezapour Lakani, Mirela Popa, Antonio Rodríguez-Sánchez, Justus Piater, CPS: 3D Compositional Part Segmentation through Grasping. 12th Conference on Computer and Robot Vision, 2015. [PDF] [Abstract] [BibTeX]
- Justus Piater is an **invited speaker** at the workshop on Robotic Hands, Grasping, and Manipulation May 30, 2015, at ICRA 2015 in Seattle.

Older News

Press

- Wie Robin gelernt hat, einen Turm zu bauen - Der Standard (May 1, 2016)
- ORF, Austria's public TV and radio service, reports on our work in the context of the Xperience and SQUIRREL projects (21.4.2016, in German):
  - Ö1 Wissen aktuell (radio)
  - Tirol heute (TV)
  - tirol.orf.at News (text + teaser video)
- Hier sind die Roboter - News (April 16, 2016, in German)
- Fast wie Science Fiction: Ein Roboter, der lernt wie ein Kind - Tiroler Tageszeitung (February 3, 2016, in German) features Emre Ugur's work on stacked learning.
- Eine Kamera als Sehhilfe (iPoint 06.02.2015, in German)
- #tiroltvvideo { display: none; } #tiroltvvideo:target { display: block; }
  Robotik an der Uni Innsbruck - TirolTV vom 1 Dezember 2014
- #raivideo { display: none; } #raivideo:target { display: block; }
  RAI Südtirol - Tagesschau vom 12 Juli 2014
- Roboter, die von Menschen lernen - (iPoint 03.01.2014, in German)
- Learning from the Brain - UIBK news 21/11/2012 reports on 2DSIL, a biologically-inspired model of shape representation.
- Stille Welt - Gehörlos in Tirol - the Tyrolean street newspaper reports on the SignSpeak project. (20er, pp. 6-7, April 2012, in German)
- Übersetzungslücken schließen - the UIBK supplement to an Austrian newspaper reports on our SignSpeak project (wissenswert 18 pp. 16-17, February 2012, in German)
- Schlaue Roboter im Haushalt (iPoint 13.04.2011, in German)
- Roboter lernen lernen (zukunft forschung 2/2010, in German)

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How to find us: See the directions.

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