ETHz Robotics and MLSS summer schools' review

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Outline

ETH Zurich

- ETH Zurich (Swiss Federal Institute of Technology in Zurich)
- As of August 2018, 32 Nobel laureates, 4 Fields Medalists, and 1 Turing Award winner have been affiliated with the Institute, including **Albert Einstein**.
- Ranked **6th** in the world
  according to QS World University Ranking,
  and **10th** in the world
  according to Times Higher Education World Rankings.

Organization

- Robotics Systems Lab (Marco Hutter h-index 29)
- Autonomous Systems Lab (Roland Siegwart h-index 97)
- Vision for Robotics Lab (Margarita Chli h-index 21)

Overview

- Symposium: 27-28 June 2019
- Summer School Dates: 29 June - 1 July 2019
- Swiss Search and Rescue Robotics Week (ARCHE): 01-05 July 2019

Program

	ETH Robotics Symposium		Summer School			ARCHE			
	Th 27 June	Fr 28 June	Sa 29 June	Su 30 June	Mo 01 July	Tu 02 July	We 03 July	Th 04 July	Fr 05 July
8:00									
8:30									
9:00		Invited Talks	Lecture	Lecture	Lecture	Special events by professional organizations (e.g. firefightres, redog, ABC, ...)			Public Event and Competition
9:30									
10:00			Tutorial	Tutorial	Tutorial				
10:30									
11:00									
11:30	Lunch		Coffee	Coffee	Coffee				
12:00		Lunch	Lecture	Lecture	Trials				
12:30									
13:00	Invited Talks		Lunch	Lunch	Lunch				
13:30									
14:00		Bus Transfer to Wangen / check-in Training Facility / Introduction to Facilities	Tutorial	Tutorial	Trials				
14:30									
15:00									
15:30			Coffee	Coffee	Coffee				
16:00			Trials	Trials	Summer School Robotic Challenge				
16:30		Introduction Summer School / Challenge description / Introduction to Robotic Platforms							
17:00	Lab Tours								
17:30									
18:00									
18:30	Symposium Evening event								
19:00			Free Time	Social Activity	Social Event BBQ				
19:30									
20:00									
20:30									

Day 1

- Sanjiv Singh - Why drive autonomously when you can fly autonomously?
  (CMU - Near Earth Autonomy)
- Achim Walter - Agriculture and robotics: A joyful marriage?
  (ETH Zurich)
- Marc Pollefeys - Mixed reality and robotics
  (ETH Zurich and Microsoft)
- Dieter Fox - Toward robust manipulation in complex scenes
  (Nvidia)
- Jamie Paik - Reconfigurable robots for interactive intuitive interfaces
  (EPFL)

Day 2

- Seth Hutchinson - Design, Modeling and Control of a Biologically-Inspired Bat Robot
  (Georgia Tech)
- Yulia Sandamirskaya - The neuromorphic computing and sensing technology in robotics
  (INI-UZH)
- Andrea Censi - Liability, ethics, and culture-aware behavior specification using rulebooks
  (ETH Zurich and nuTonomy / Aptiv)
- Sami Haddadin - The gentle robot
  (TU Munich and Franka Emika)

Work to follow

Figure 2

Work to follow

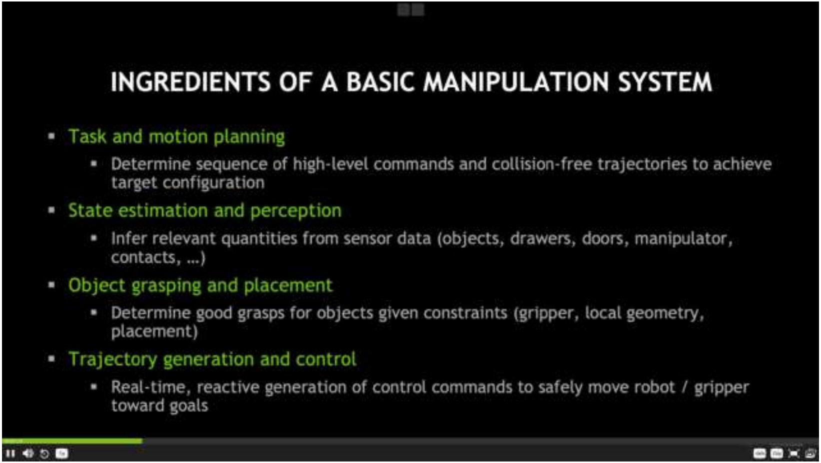


Figure 3

Work to follow

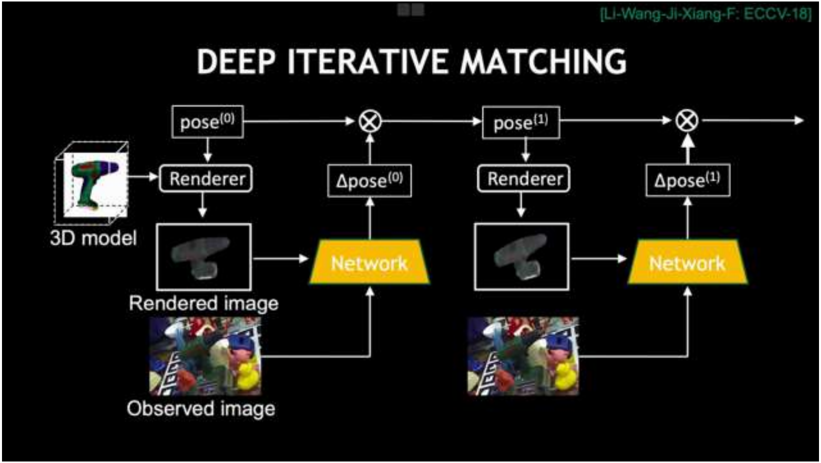


Figure 4

Work to follow

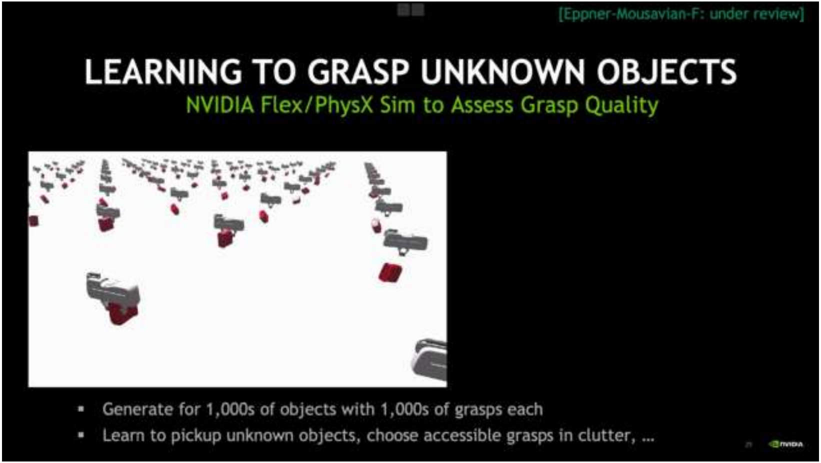


Figure 5

Work to follow

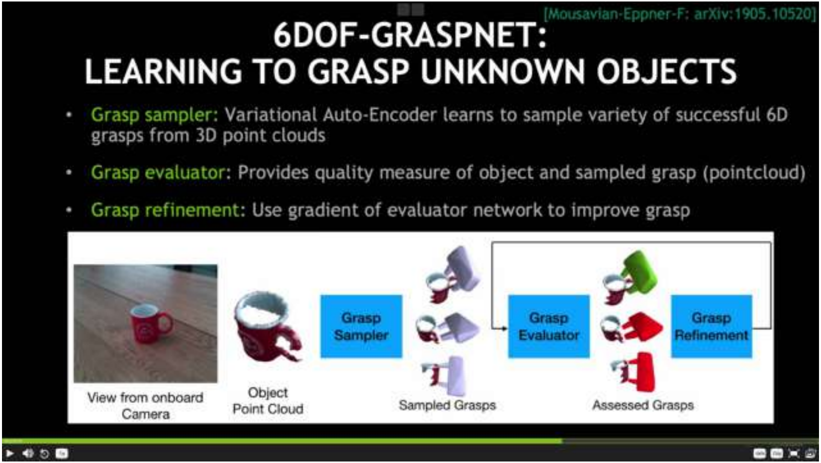


Figure 6

Work to follow

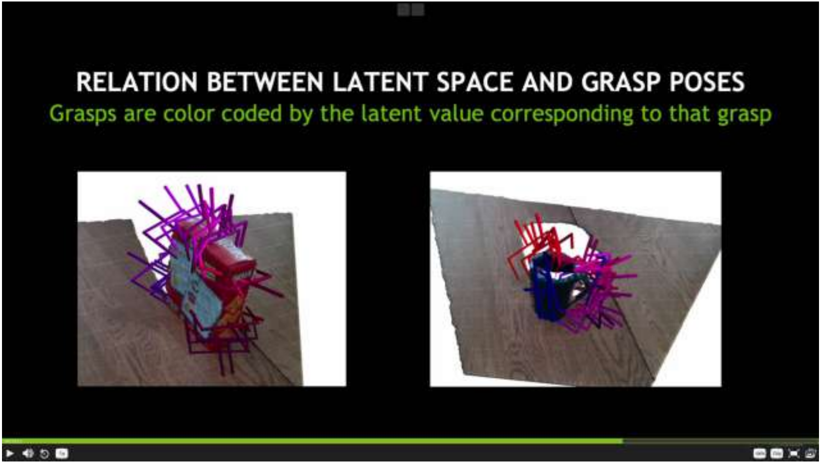


Figure 7

Work to follow

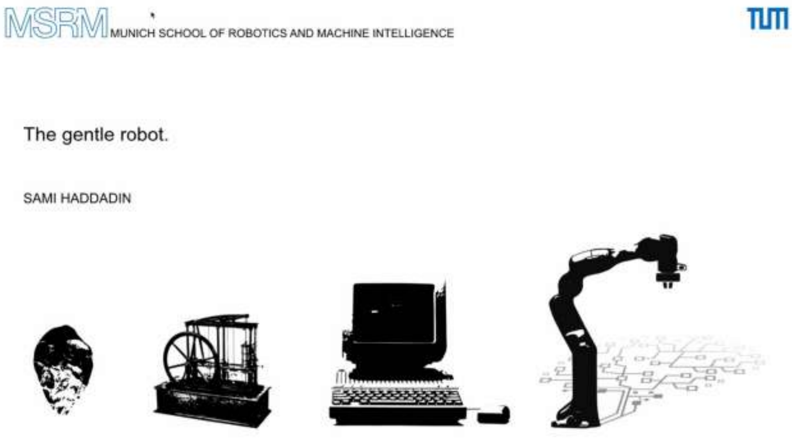


Figure 8

Work to follow

Figure 9

Work to follow

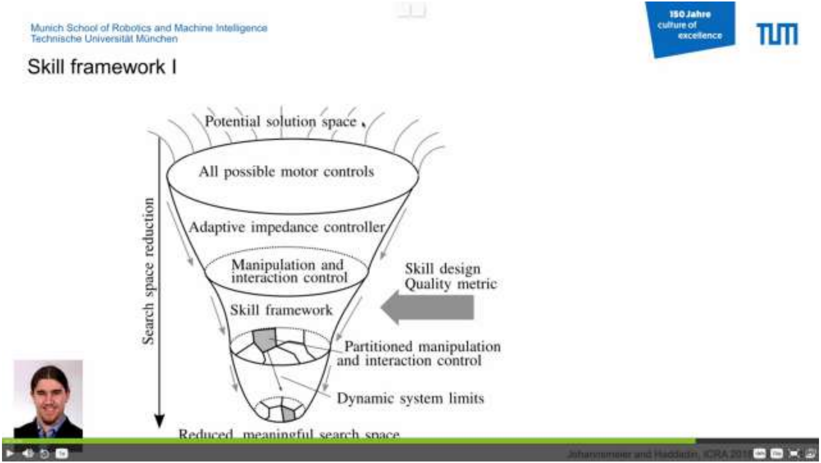


Figure 10

Work to follow

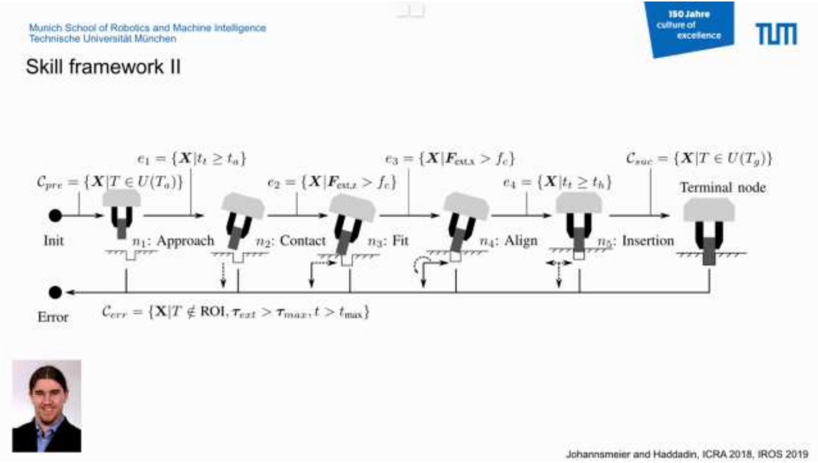


Figure 11

Work to follow

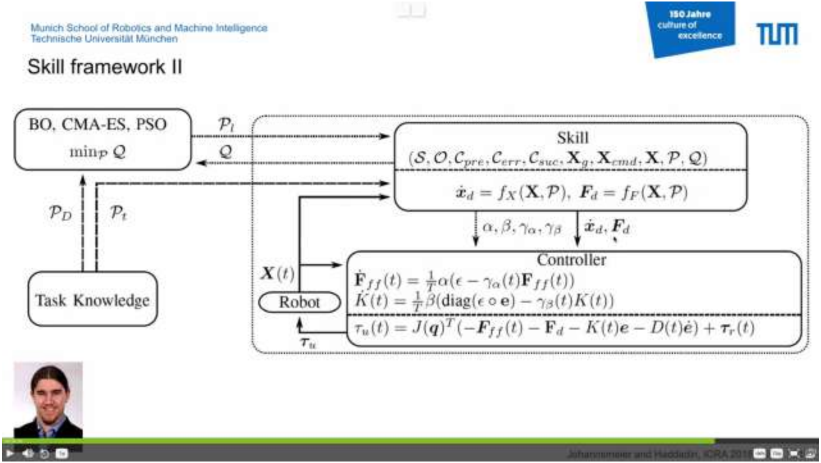


Figure 12

Summer school

My team

Figure 14

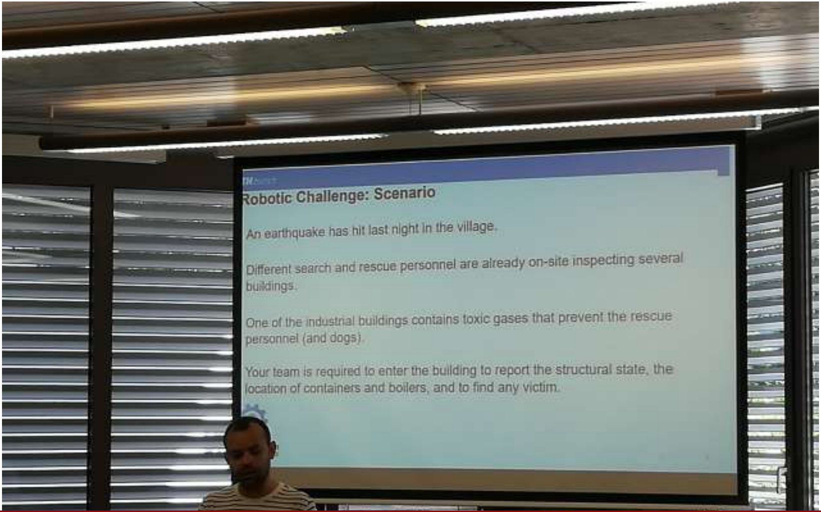
Lectures and tutorials

1. Robot Introduction (platform and connection to the robot)
2. State estimation (Calibration and batch optimization, Online sensor fusion, Latency compensation)
3. Robot motion planning (Graph search methods e.g. A*, Collision avoidance, Sampling-based planning)
4. Trajectory optimization or optimization-based control (Policy search, Trajectory optimization, Dynamic programming, Model Predictive Control)
5. Teaching Robots to See: SLAM and beyond (FAST, BRIEF, BRISK, Filtering, CVI-SLAM)

Robot

Figure 15

Robotics challenge



Robotics challenge

Organization

- Marc Deisenroth (Imperial College London) h-index 30
- Arthur Gretton (University College London) h-index 52

Program

	July 15	July 16	July 17	July 18	July 19	July 20	July 21	July 22	July 23	July 24	July 25	July 26
07:30	Registration and Welcome											
09:00	Variational Inference	Optimization	Deep Learning	Reinforcement Learning	Gaussian Processes	Social Event		Kernels	MCMC	Approximate Bayesian Computation	Speech Processing	ML in Computational Biology
11:00	Coffee Break	Coffee Break	Coffee Break	Coffee Break	Coffee Break			Coffee Break	Coffee Break	Coffee Break	Coffee Break	Coffee Break
11:30	Variational Inference	Optimization	Deep Learning	Tutorial Reinforcement Learning	Gaussian Processes			Kernels	MCMC	Tutorial Approximate Bayesian Computation	Tutorial Speech Processing	Submodularity
13:30	Lunch Break	Lunch Break	Lunch Break	Lunch Break	Lunch Break			Lunch Break	Lunch Break	Lunch Break	Lunch Break	Lunch Break
14:30											Learning Theory	
15:00	Tutorial Variational Inference	Tutorial Optimization		Interpretability	Tutorial Gaussian Processes			Tutorial Kernels	Tutorial MCMC			Tutorial Submodularity
15:30			Tutorial Deep Learning							Fairness		
16:30											Coffee Break	
17:00				Coffee Break	Coffee Break				Coffee Break		Learning Theory	
17:30	G-Research Welcome Reception	Poster Session	Coffee Break	Interpretability	AI for Good + Panel Discussion			Industry Event and Poster Session	Approximate Bayesian Computation	Coffee Break		Farewell Reception at Bloomberg
18:00			Reinforcement Learning							Speech Processing		
18:30											Farewell Dinner	
					Microsoft Mid-course Reception at the British Library							

Figure 18

Lectures

- Shakir Mohamed (DeepMind): Variational Inference
- John Duchi (Stanford University): Optimization
- Kevin Webster (FeedForward, Imperial College London): Deep Learning
- Pierre Richemond (Imperial College London): Deep Learning
- Kai Arulkumaran (Imperial College London): Deep Learning

Lectures

- Katja Hofmann (Microsoft Research Cambridge): Reinforcement Learning
- Sanmi Koyejo (University of Illinois at Urbana-Champaign; Google AI Accra): Interpretability
- James Hensman (PROWLER.io): Gaussian Processes
- Moustapha Cissé (AIMS Rwanda and Google AI, Accra): AI for Good
- Julien Cornebise (Element AI): AI for Good

Lectures

- Lorenzo Rosasco (IIT, University of Genova, MIT): Kernels
- Michael Betancourt (Symplectomorphic): Markov Chain Monte Carlo
- Sarah Filippi (Imperial College London): Approximate Bayesian Computation
- Timnit Gebru (Google): Fairness in Machine Learning

Lectures

- Karen Livescu (Toyota Technological Institute at Chicago): Speech Processing
- Samory Kpotufe (Columbia University): Learning Theory
- Barbara Engelhardt (Princeton University): Machine Learning in Computational Biology
- Stefanie Jegelka (MIT): Submodularity

MLSS

Figure 19

My group at MLSS

Figure 20

Work to follow

1. MPC with Gaussian Processes (Prof. Melanie Zeilinger - ETH)

Thanks!