ICAPS

Pittsburgh 2017

The 27th International Conference on Automated Planning and Scheduling

Pittsburgh, June 2017

Welcome! We hope you enjoy the conference in Pittsburgh!

The ICAPS 2017 Conference would like to acknowledge the generous support of:

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IBM

NSF, National Science Foundation

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General Information

On-Site Information

The conference is being held at Carnegie Mellon University, with most events scheduled in the Gates Hillman Center (GHC), see map on page 5. There are two main entrances:

- Directly from Forbes – The main ICAPS conference presence and registration desk will be at this entrance (4th floor).

- From the West entrance – This entrance is on the 3rd floor. Go straight to the end of the hall and take the elevator up to 4th floor.

Free WiFi is available via **CMU-GUEST** (using the access code KNKC4CD5), or **eduroam**.

Proceedings

We are pleased to report that Individual papers from the ICAPS 2017 conference have been placed in the permanent open access AAAI Digital Library at http://www.aaai.org/Library/ICAPS/icaps17contents.php. You can download individual papers from ICAPS-2017 from this url after June 14 2017.

The complete ICAPS-2017 Proceedings will be available for download effective June 15, 2017. Each ICAPS conference registrant can download a complimentary copy of this volume in searchable PDF format. Please note that it will be a large file.

To download the proceedings, please follow these directions after going to the following URL:

https://aaai.org/ICAPS-EBook/ICAPS-Proceedings-2017.pdf
username: icapsebook
password: smith17Barbulescuv27

All access will be logged.

The ebook will be available without charge to conference registrants only through July 28, 2017.

Floor Plans

Floor plans for the GHC are provided on pages 6-7. In addition, page 8 has a floor plan for Newell-Simon Hall (NSH), where a few workshops are scheduled. Room numbers accompany each scheduled item. There is a bridge that connects the fourth floor of the GHC with the fourth floor of NSH (the start of the bridge is shown at the bottom of the map for the GHC fourth floor, on page 6). The poster session is in the Cohon University Center (CUC), which is a short walk from the GHC.

Opening Reception and Banquet

The opening reception and banquet are off-site at The Frick, and at The Carnegie Museum, respectively.
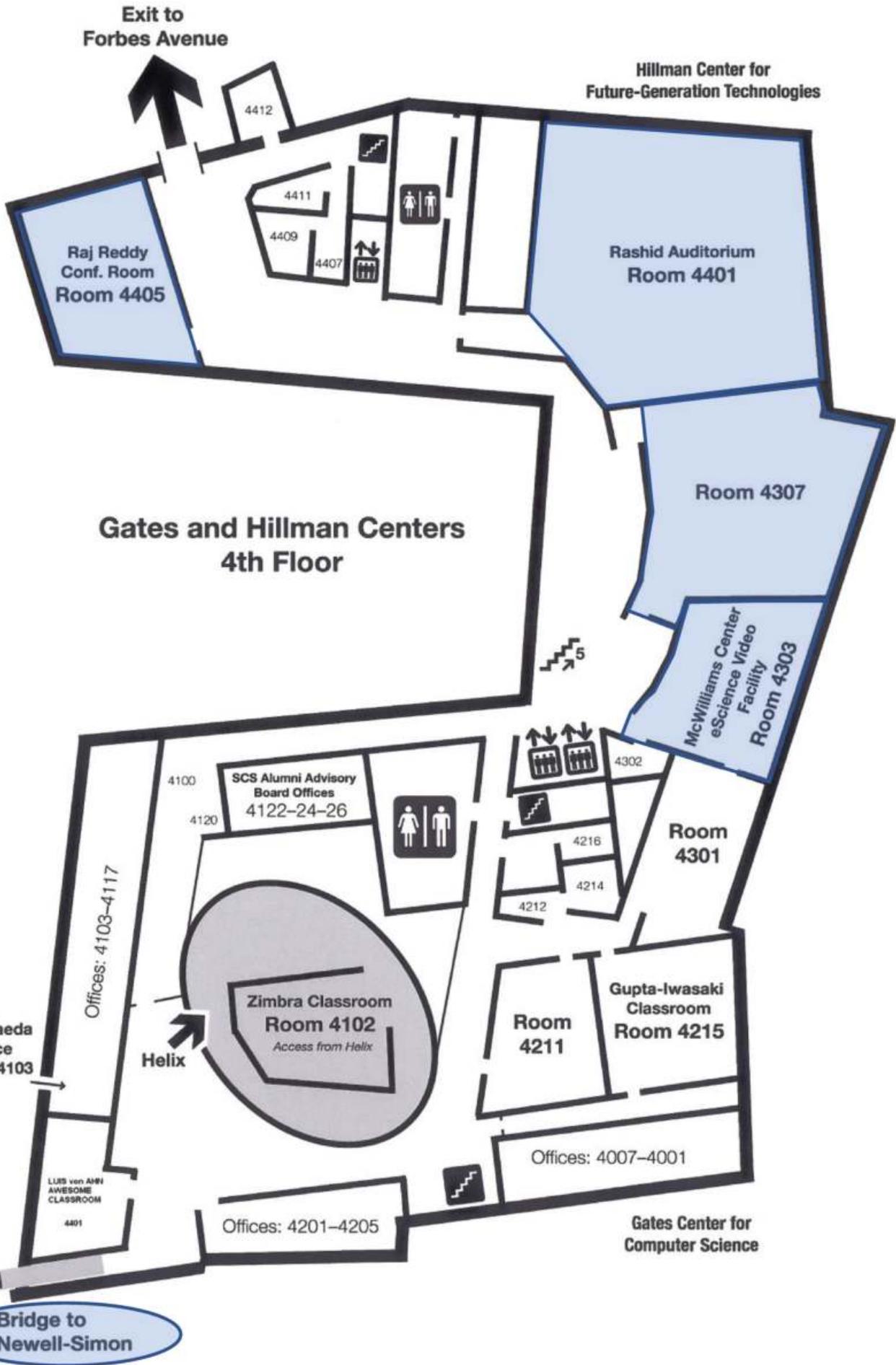
Transportation will be provided between CMU and The Frick for the reception on Tuesday, June 20th. The reception will run from 6:00 pm to 8:00 pm. Four shuttles will make continuous loops between CMU and The Frick, starting at 5:20 pm and ending at 9:00 pm. The shuttles will pick up and drop off at CMU in front of the CUC. Please remember to bring your badge to the the reception.

The Carnegie Museum is down Forbes avenue from the CMU campus and is within walking distance. The address for the museum is: Carnegie Museum of Natural History, 4400 Forbes Avenue, Pittsburgh, PA 15213. The banquet will take place in the Carnegie Music Hall Foyer, on Thursday, June 22nd, at 6:30pm. Please remember to bring your badge to the banquet and tickets for guests. Attendees are encouraged to arrive early and take advantage of free admission to the museum for conference attendees and guests with tickets. Free admission begins at 6:00 pm. Admission tickets can be picked up in the Carnegie Music Hall Foyer.

Instructions for Speakers

Presenters of long papers and papers in the Journal Track are given 16 minutes + 4 more for questions. Presenters of short papers are given 12 minutes + 3 for questions. Please be in the room where you will be presenting 5 minutes before the session begins and introduce yourself to the session chair.
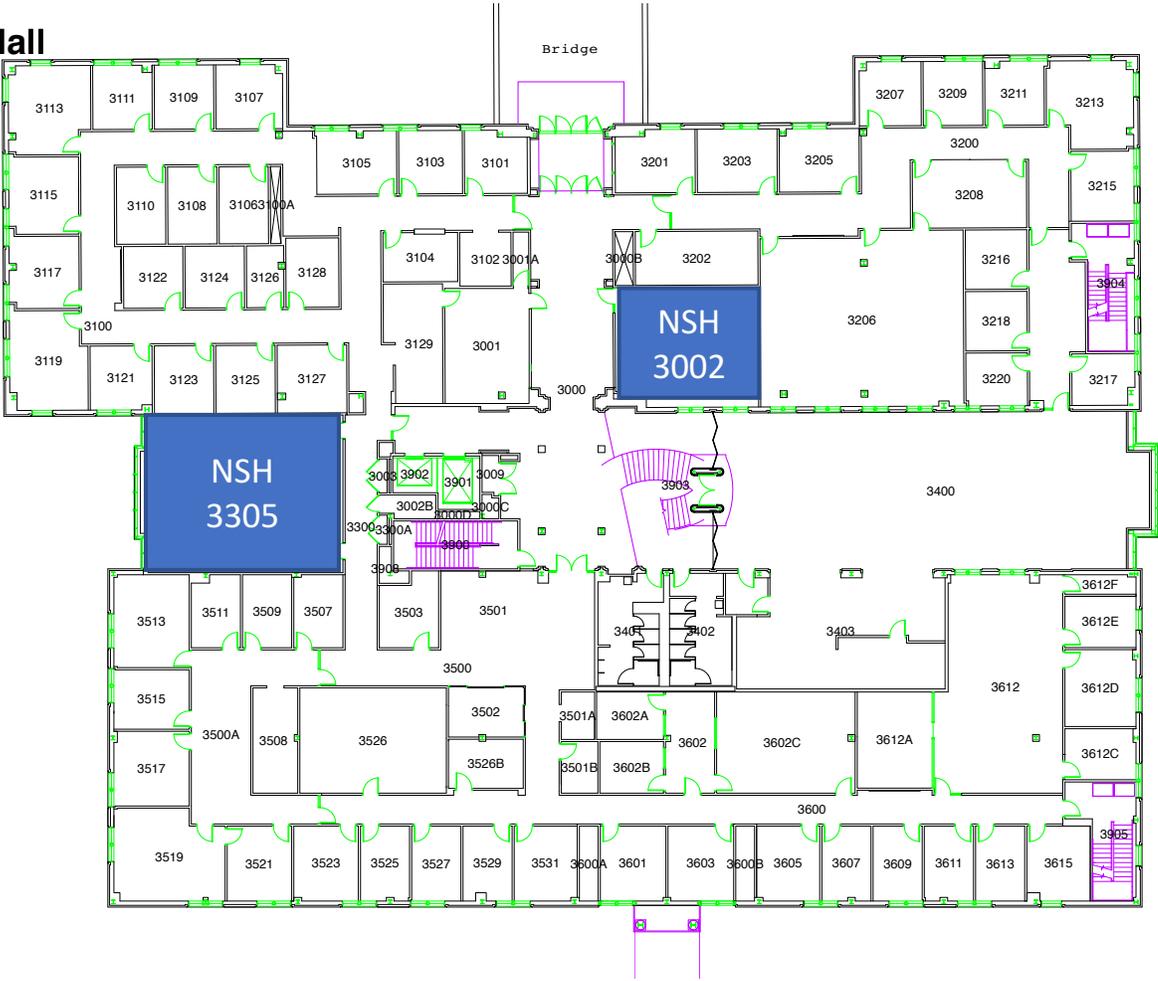
Conference talks are being video-recorded by default. You will be asked to sign a consent form to agree to the publication of the recording. If you do not want the recording of your talk to be published, then decline to sign the form.

Instructions for Poster Presenters

The poster session will take place on Wednesday, in the Rangos rooms on the second floor of the Cohon University Center, which is a short walk from GHC, where most of the other events will take place. The poster boards include push pins and will be erected by site staff; the posters may be set up starting at 5pm, during the break immediately preceding the poster session itself.

**Exit to
Forbes Avenue**

4412

**Hillman Center for
Future-Generation Technologies**

4411

4409

4407

**Raj Reddy
Conf. Room
Room 4405**

**Rashid Auditorium
Room 4401**

Room 4307

**Gates and Hillman Centers
4th Floor**

5

**McWilliams Center
eScience Video
Facility
Room 4303**

4100

**SCS Alumni Advisory
Board Offices
4122-24-26**

4302

4120

4216

**Room
4301**

4214

4212

Offices: 4103–4117

**Zimbra Classroom
Room 4102**
Access from Helix

**Gupta-Iwasaki
Classroom
Room 4215**

**The Maeda
Office
Room 4103**

Helix

**Room
4211**

LUIS von AHN
AWESOME
CLASSROOM

4401

Offices: 4007–4001

Offices: 4201–4205

**Gates Center for
Computer Science**

**Bridge to
Newell-Simon**

The Gates and Hillman Centers
Floor 6

Hillman Center

6701
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GHC
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Gates Center

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GHC 6115

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Elevators

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Newell-Simon Hall
Floor 3

Bridge

NSH 3002

NSH 3305

Room			
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3115	3110	3108	3106 3100A
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3100			
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3201 3203 3205

3207 3209 3211 3213

3200

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3129 3001 3000 3220 3217

3003 3902 3009
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3002B 3000C
3300 3300A 3000D
3908 3903 3400
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3513 3511 3509 3507 3503 3501

340 3402 3403 3612F

3500 3612E

3515 3612 3612D

3500A 3508 3526 3502 3501A 3602A 3612A 3612C

3517 3526B 3602 3602C

3501B 3602B 3600

3519 3521 3523 3525 3527 3529 3531 3600A 3601 3603 3600B 3605 3607 3609 3611 3613 3615 3905

Best Paper Awards

Main Track

Best Paper Occupancy Measure Heuristics for Probabilistic Planning
  Felipe Trevizan, Sylvie Thiebaux, and Patrik Haslum

Best Student Paper Unsolvability Certificates for Classical Planning
  Salomé Eriksson, Gabriele Röger and Malte Helmert

Honorable Mention for Best Student Paper Automatic Extraction of Axioms for Planning
  Shuwa Miura and Alex Fukunaga

Robotics Track

Best Paper Cooperative Multi-Robot Sampling-Based Motion Planning with Dynamics
  Duong Le and Erion Plaku

Planning and Execution Competition for Logistics Robots in Simulation

Erez Karpas, Tim Niemueller, Tiago Vaquero, Eric Timmons

Tuesday: Room GHC 6501 and Wednesday: Poster Session

The Planning and Execution Competition for Logistics Robots in Simulation is meant to provide a concrete challenge in planning and execution, to bring the planning and robotics communities closer together. The competition will run for the first time during ICAPS (the first round is scheduled to run on June 20th, and the finals on June 21st during the ICAPS poster sesstion).

Schedule Overview

			Room		
Time	GHC 4401	GHC 6115	GHC 4303	GHC 4405	NSH 3305
08:00 am –	Registration				
09:00 am –10:30 am	SPARK	T1	PlanSOpt	GenPlan	KEPS
10:30 am –11:00 am	Coffee Break				
11:00 am –12:30 pm	SPARK	T1	PlanSOpt	GenPlan	KEPS
12:30 pm –2:00 pm	Lunch				
2:00 pm – 3:30 pm	SPARK	T6	T5	GenPlan	KEPS
3:30 pm – 4:00 pm	Coffee Break				
4:00 pm –5:30 pm	SPARK	T7	T5	GenPlan	KEPS

NB Consult workshop schedules for precise timing of sessions – some may start earlier or finish later.

Workshops

SPARK Scheduling and Planning Applications woRKshop (all day). Detailed schedule on page 18.

PlanSOpt Planning, Search, and Optimization (half day). Detailed schedule on page 18.

GenPlan Generalized Planning (all day). Detailed schedule on page 19.

KEPS Workshop on Knowledge Engineering for Planning and Scheduling (all day). Detailed schedule on page 20.

Tutorials Details on page 15

T1) AI Planning for Robotics and Human-Robot Interaction Michael Cashmore, Luca Iocchi, Daniele Magazzeni. Half Day

T5) Answer Set Planning – Foundations and Applications Tran Cao Son, Enrico Pontelli, Marcello Balduccini. Half Day

T6) Alternatives to Explicit State Space Search: Symbolic Search Álvaro Torralba, Daniel Gnad. Quarter Day

T7) Alternatives to Explicit State Space Search: Decoupled Search Álvaro Torralba, Daniel Gnad. Quarter Day

Planning and Execution Competition for Logistics Robots in Simulation The competition will take place in **GHC 6501**.

Tuesday (June 20, 2017)

Time	Room					
	GHC 4401	GHC 6115	GHC 4303	GHC 4405	NSH 3305	NSH 3002
08:00 am –	Registration					
09:00 am –10:30 am	HSDIP	PlanRob	COPLAS	T4	UISP	IntEx
10:30 am –11:00 am	Coffee Break					
11:00 am –12:30 pm	HSDIP	PlanRob	COPLAS	T4	UISP	IntEx
12:30 pm –2:00 pm	Lunch					
2:00 pm – 3:30 pm	HSDIP	PlanRob	T2	T3	UISP	-
3:30 pm – 4:00 pm	Coffee Break					
4:00 pm –5:30 pm	HSDIP	PlanRob	T2	T3	UISP	-

NB Consult workshop schedules for precise timing of sessions – some may start earlier or finish later.

Workshops

HSDIP Heuristics and Search for Domain-independent Planning (all day). Detailed schedule on page 21.

PlanRob Planning and Robotics (all day). Detailed schedule on page 23.

COPLAS Constraint Satisfaction Techniques for Planning and Scheduling (morning). Detailed schedule on page 24.

UISP User Interfaces and Scheduling and Planning (all day). Detailed schedule on page 24.

IntEx Integrated Execution of Planning and Acting (morning). Detailed schedule on page 26.

Tutorials Details on page 16

T2) Deliberation in Planning and Acting Malik Ghallab, Dana Nau, and Paolo Traverso. Half Day

T3) Introduction to CP Optimizer for Scheduling Philippe Laborie. Half Day

T4) Knowledge Engineering in Planning: Representation Matters Lukáš Chrpa, Mauro Vallati. Half Day

Planning and Execution Competition for Logistics Robots in Simulation The competition will take place in **GHC 6501**.

Invited Talk

Energy Systems: Challenges and Opportunities for ICAPS

Sylvie Thiébaux

The Australian National University and Data61

Wednesday 21st June 08:30 – 09:30   Room: GHC 4401

Abstract

Energy systems are facing significant challenges in coping with an aging infrastructure, reducing energy consumption and carbon emissions, and integrating renewables, energy storage and distributed technologies. Optimisation and AI have a transformational role to play in addressing these challenges, by enabling the replacement of human-in-the-loop operations with automated planning and scheduling systems. In this talk I will describe a number of concrete planning and scheduling problems in this area on which we have worked over the past few years. I will discuss the solutions we have developed, which often exploit optimisation methods and tools, as well as the opportunities and difficulties in extending AI planning and scheduling to handle these type of problems.

Bio

Sylvie Thiébaux is a professor of computer science at the Australian National University and Data61 (formerly NICTA). Her research interests include automated planning and scheduling, model-based diagnosis, optimisation and search, as well as their applications to future energy systems. Her current research focuses on developing techniques that can handle larger and more complex problems featuring uncertainty, mixed discrete-continuous dynamics, and coordination among multiple entities. She leads the CONSORT project which applies these techniques in developing distributed optimisation methods enabling consumer-owned battery systems to simultaneously provide value to their owners and support to the grid. Sylvie is an associate editor AIJ, and was an associate editor of JAIR, a councilor of AAAI, the president and a program co-chair of ICAPS, and a director of NICTA's Canberra Laboratories.

Invited Talk

Planning for Human-AI Interaction in Autonomous Mobile Robots

Manuela Veloso

Carnegie Mellon University

Thursday 22nd June 08:30 – 09:30   Room: GHC 4401

Abstract

In this talk, I will present our autonomous mobile service robots, as they achieve tasks and interact with their human users. I will briefly present the localization algorithm for their autonomous navigation in our indoor multi-floor buildings. And I will then focus on our work towards enabling humans and the autonomous robots to interact in a transparent manner. I will present our symbiotic autonomy approach and the verbalization of their route and task planning. Users can ask questions and receive answers about the autonomous performance of the robots. We will present the representation and use of the planning search and rationale, as well as the learning of important features in the corresponding execution to enable an effective human-AI interaction. The talk will report on joint work with my past and current students, in particular Joydeep Biswas, Vittorio Perera, Stephanie Rosenthal, and Sai P. Selvaraj.

Bio

Manuela M. Veloso is the Herbert A. Simon University Professor in the School of Computer Science at Carnegie Mellon University. She is the Head of the Machine Learning Department, and researches in Artificial Intelligence. Veloso is Fellow of the ACM, IEEE, AAAS, AAAI. With her students, she researches with a variety of autonomous robots, including mobile service robots and soccer robots. See www.cs.cmu.edu/m̄mv for further information, including publications.

How Can AI be Used for Social Good? Key Research Challenges, Applications, and Results

Milind Tambe

University of Southern California

Friday 23rd June 08:30 – 09:30   Room: GHC 4401

Abstract

Discussions about the future negative consequences of AI sometimes drown out discussions of the current accomplishments and future potential of AI in helping us solve complex societal problems. At the USC Center for AI in Society, CAIS, our focus is on advancing AI research in tackling wicked problems in society. This talk will highlight the goals of CAIS and three areas of ongoing work. First, I will focus on the use of AI for assisting low-resource communities, such as homeless youth. Harnessing the social networks of such youth, I will outline our advances in influence maximization algorithms to help more effectively spread health information, such as for reducing risk of HIV infections. These algorithms have been piloted in homeless shelters in Los Angeles, and have shown significant improvements over traditional methods. Second, I will outline the use of AI for protection of forests, fish, and wildlife; learning models of adversary behavior allows us to predict poaching activities and plan effective patrols to deter them; I will discuss concrete results from tests in a national park in Uganda that have led to removal of snares and arrests of poachers, potentially saving some animals. Finally, I will focus on the challenge of AI for public safety and security, specifically for effective security resource allocation. I will also briefly discuss our "security games" framework – based on computational game theory – which has led to decision aids that are in actual daily use by agencies such as the US Coast Guard, the US Federal Air Marshals Service and local law enforcement agencies to assist the protection of ports, airports, flights, and other critical infrastructure. I will also highlight a number of other projects at CAIS, and we expect these and other future projects at CAIS to continue to illustrate the significant potential that AI has for social good.

Bio

Milind Tambe is Founding Co-Director of CAIS, the USC Center for AI in Society, and Helen N. and Emmett H. Jones Professor in Engineering at the University of Southern California(USC). He is a fellow of AAAI and ACM, as well as recipient of the ACM/SIGAI Autonomous Agents Research Award, Christopher Columbus Fellowship Foundation Homeland security award, INFORMS Wagner prize for excellence in Operations Research practice, Rist Prize of the Military Operations Research Society, IBM Faculty Award, Okawa foundation faculty research award, RoboCup scientific challenge award, and other local awards such as the Orange County Engineering Council Outstanding Project Achievement Award, USC Associates award for creativity in research and USC Viterbi use-inspired research award. Prof. Tambe has contributed several foundational papers in AI in areas such as multiagent systems and security games; these papers have received influential paper award and multiple best paper awards at conferences such as AAMAS, IJCAI, IAAI and IVA. In addition, Prof. Tambe pioneering real-world deployments of security games has led him and his team to receive the US Coast Guard Meritorious Team Commendation from the Commandant, US Coast Guard First District's Operational Excellence Award, Certificate of Appreciation from the US Federal Air Marshals Service and special commendation given by LA Airport police from the city of Los Angeles. For his teaching and service, Prof. Tambe has received the USC Steven B. Sample Teaching and Mentoring award and the ACM recognition of service award. He has also co-founded a company based on his research, Avata Intelligence, where he serves as the director of research. Prof. Tambe received his Ph.D. from the School of Computer Science at Carnegie Mellon University.

AI Planning for Robotics and Human-Robot Interaction

Michael Cashmore, Luca Iocchi, Daniele Magazzeni
Length: Half Day
Monday, AM slot   Room: GHC 6115

Planning for real robots is hard! Indeed, planning for interesting robotics problems requires rich models to capture complex dynamics as well as the uncertain and evolving environment, scalable planning techniques and robust methods of execution. There are many open problems, including the handling of temporal constraints, how to exploit opportunities, and how to handle failure and anticipate it in the future. At the same time, integration issues have been limiting factors for the actual use of PDDL planners for the control of ROS systems. Things are getting better! This talk will first highlight recent advances in modelling complex robotics scenarios (using PDDL+) and planning with them (using SMT-based planning). The tutorial will then offer an overview of ROSPlan, the open-source framework for using AI Planning directly with ROS systems.

Alternatives to Explicit State Space Search: Symbolic Search

Álvaro Torralba, Daniel Gnad
Length: Quarter Day
Monday, PM slot 1   Room: GHC 6115

Explicit state space search has arguably been the most popular way of solving classical planning problems in the last years. Although alternatives like, e.g., SAT-based planning or Petri-Net unfolding have been proposed, most of the research in the field still focuses on explicit search techniques. This tutorial takes a closer look at one alternative to explicit search, namely symbolic search. In symbolic search, a single node represents a set of states using data-structures like Binary Decision Diagrams (BDDs). BDDs are able efficiently represent arbitrary sets of states, often with an exponential gain over their explicit enumeration. The tutorial will explain the basic building blocks behind symbolic search, including applications using BDDs to represent sets of states outside of symbolic search. Then it gives the details behind the two main symbolic search algorithms — symbolic bidirectional blind search and symbolic A*.

Alternatives to Explicit State Space Search: Decoupled Search

Álvaro Torralba, Daniel Gnad
Length: Quarter Day
Monday, PM slot 2   Room: GHC 6115

Star-Topology Decoupled Search has recently been introduced as an alternative to explicit state space search to tackle the well-known state space explosion problem inherent in planning as heuristic search. It is a form of factored planning, where the dependencies between the factors are forced to take the form of a star topology, with a center factor that can interact arbitrarily with multiple leaf factors. All interaction between the leaves must be via the center. By exploiting the conditional independence between the leaves, decoupled search can exponentially reduce the search effort compared to explicit search. The tutorial will introduce the theoretical framework in more detail: How exactly does the search work? How to identify star

topologies? How can we connect to other search techniques like heuristics, pruning methods, ...? Under which conditions does decoupled search perform well? Where not? Why? The second part will give a closer look at decoupled search within the Fast Downward planning system. Some important design choices to obtain good performance will be highlighted together with possible extensions to develop new techniques for decoupled search. Attendants will be given the opportunity to implement an easy heuristic for decoupled search.

Answer Set Planning – Foundations and Applications

Tran Cao Son, Enrico Pontelli, Marcello Balduccini
Length: Half Day
Monday, PM slot   Room: GHC 4303

This tutorial introduces Answer Set Programming (ASP) and its application in planning: Answer Set Planning. ASP is a novel problem solving paradigm, rooted in logic programming. In this approach, a problem is translated into a logic program, whose answer sets correspond one-to-one to the solutions of the original problem. Answer sets can be computed using state-of-the-art ASP solvers, which have made significant progress in performance and scalability in recent years. The goal of the tutorial is to provide the audience with the basic foundations and recent advancements that are directly related to the development of planning systems for complex domains building on ASP technology. The tutorial will begin with an overview of ASP and of the basic idea of answer set planning. It will then illustrate these concepts with various examples and discuss some of the issues of standard ASP. The tutorial will continue with the description of various techniques and problems that address these issues in scheduling and distributed constraint optimization. The tutorial will finally describe two problems of interest to the planning community and discuss their ASP-based solutions.

Knowledge Engineering in Planning: Representation Matters

Lukáš Chrpa, Mauro Vallati
Length: Half Day
Tuesday, AM slot   Room: GHC 4405

Domain-independent planning has achieved significant improvement in the last decade, and many advanced planning engines are now available. In order to exploit domain-independent planning in intelligent systems, one has to develop a domain model that describes environment and available actions. One of the core aims of Knowledge Engineering in planning is to develop domain models that are correct and accurate. At the same time, the way in which domain models are encoded strongly affects the performance of planning engines; it is therefore pivotal to encode domain models such that planning engines can efficiently reason with them. This tutorial provides an overview of available tools and techniques for the effective design and development of domain models, with a focus on those highlighted in the recent ICKEPS competition. It will then show how performance of domain-independent planning engines can be improved by exploiting domain knowledge, and it will discuss the main automatic domain knowledge extraction approaches.

Tutorials

Deliberation in Planning and Acting

Malik Ghallab, Dana Nau, and Paolo Traverso
Length: Half Day
Tuesday, PM slot　　　Room: GHC 4303

This tutorial is about how to combine two deliberative activities: planning what actions to perform, and deciding how to perform them. Previous research has usually addressed planning and acting separately, and has concentrated primarily on the planning part. However, recent progress has led to an increased appreciation of the deliberation required for acting, and the importance of combining planning and acting. The tutorial will present a comprehensive paradigm for combining planning and acting, including deterministic, hierarchical, temporal, and nondeterministic models and algorithms; and we will discuss which kinds of models are best in which kinds of situations. Supporting materials will include electronic copies of the lecture slides and the final manuscript of the new book, Automated Planning and Acting (Cambridge University Press, 2016). The tutorial will be useful as an up-to-date tutorial for students, a reference work for practitioners, and a roadmap for future research.

Introduction to CP Optimizer for Scheduling

Philippe Laborie
Length: Half Day
Tuesday, PM slot　　　Room: GHC 4405

CP Optimizer is a generic Constraint Programming (CP) based system to model and solve scheduling problems (among other combinatorial problems). It provides an algebraic language with simple mathematical concepts such as intervals or functions to capture the temporal dimension of scheduling problems in a combinatorial optimization framework. From the very beginning, CP Optimizer was designed with the goal to provide a similar experience as Mathematical Programming (MP) tools like CPLEX, with a strong focus on usability. In particular CP Optimizer implements a model & run paradigm that does not require the user to understand Constraint Programming or scheduling algorithms: declarative modeling is the only thing that matters. The automatic search provides good out of the box performance and is continuously improving from version to version. The convergence with MP goes even further, with a convergence of the tools and functionalities around the engine like an input/output format, modeling assistance with warnings and conflict refiner, interactive executable, etc. These tools accelerate the development and maintenance of models for complex industrial scheduling problems that will be efficiently solved by the automatic search. This tutorial, heavily illustrated with examples, will give an overview of CP Optimizer for scheduling. No prior knowledge of Constraint Programming is required.

Workshops

Scheduling and Planning Applications woRKshop (SPARK)

Sara Bernardini, Shirin Sohrabi, Simon Parkinson, and Kartik Talamadupula
Monday: room GHC 4401

Application domains that contain planning and scheduling (P&S) problems present a set of interesting challenges to the AI planning and scheduling community - from modeling to technical to institutional issues. New real-world domains and problems are becoming increasingly affordable for AI. The international Scheduling and Planning Applications woRKshop (SPARK) series was established to foster the practical application of advances made in the AI P&S community.

09:00-10:30am Session 1

Domain-independent Metrics for Deciding When to Intervene
Sachini Weerawardhana and Mark Roberts

Optimizing Electric Vehicle Charging Through Determinization
Sandhya Saisubramanian, Shlomo Zilberstein and Prashant Shenoy

Towards Automated Vulnerability Assessment
Saad Khan and Simon Parkinson

10:30-11:00am Coffee Break

11:00am-12:15pm Session 2

Invited Talk: An Architecture for Knowledge Representation and Interactive Learning of Domain Axioms in Robotics
Mohan Sridharan

Temporal Planning for Compilation of Quantum Approximate Optimization Algorithm Circuits
Davide Venturelli, Minh Do, Eleanor Rieffel and Jeremy Frank

12:15-01:50pm Lunch

01:50-03:30pm Session 3

Invited Talk: Human-Planning Teaming in Applications: When Full Autonomy is Too Much!
Daniele Magazzeni

Planning-based Scenario Generation for Enterprise Risk Management
Shirin Sohrabi, Anton Riabov and Octavian Udrea

Traverse Planning with Temporal-Spatial Constraints
John Bresina, Paul Morris, Matt Deans, Tamar Cohen and David Lees

03:30-04:00pm Coffee Break

04:00pm Session 4

Coverage Planning for Earth Observation Constellations
Evridiki Ntagiou, Claudio Iacopino, Nicola Policella, Roberto Armellin and Alessandro Donati

A Case for Collaborative Construction as Testbed for Cooperative Multi-Agent Planning
Sven Koenig and T. K. Satish Kumar

Panel Discussion

Planning, Search, and Optimization (PlanSOpt)

Andre A. Cire, Christina Burt, Florian Pommerening, and Christian Muise

Monday morning: room GHC 4303

The field of AI planning shares many parallels with a diverse range of optimization areas, such as mathematical programming, constraint programming, and stochastic optimization. However, the potential integration of concepts and techniques used in these fields remains largely unexplored. For instance, one of the most popular strategies for solving planning problems is A^* search, which is similar in many ways to a branch-and-bound strategy that is predominantly used to solve mixed-integer linear programming (MILP) problems. This opens the possibility of adapting several auxiliary methods to speed up search (including, e.g., merging, landmarks, and cutting planes algorithms) from one area to the other.

09:00-10:30am Session 1

Invited Talk: The Phase Transition in Heuristic Search
J. Christopher Beck

Accelerated Vector Pruning for Optimal POMDP Solvers
Erwin Walraven and Matthijs T. J. Spaan

10:30-11:00am Coffee break

11:00am-12:30pm Session 2

Axioms in Model-based Planners
Shuwa Miura and Alex Fukunaga

Active Tree Search
Robert Lieck and Marc Toussaint

Occupation Measure Heuristics for Probabilistic Planning
Felipe Trevizan, Sylvie Thiebaux and Patrik Haslum

Generalized Planning (GenPlan)

Siddharth Srivastava, Sheila McIlraith, Ron Petrick, Vaishak Belle

Monday: all day, room GHC 4405

Automated planning is a fundamental area of AI, concerned with computing behaviors which when executed in an initial state realize the goals and objectives of the agent. In the last 15 years, we have seen great advances in the efficiency of automated planning techniques, as a consequence of a variety of innovations, including advances in heuristic search for classical planning, and the application of classical planning to non-classical planning tasks. Nevertheless, industrial-level scalability remains a fundamental challenge to the broad applicability of AI automated planning techniques. This is especially notable when the space of objects is (possibly) infinite or when there is inherent uncertainty about the initial plan parameters.

This workshop aims to bring together researchers working on emerging directions for addressing this challenge, including: (1) achieving scalability through plans that include cyclic flow of control and solve large classes of problems, (2) acquisition (through learning or search) of domain control knowledge for reducing the cost of planning, or otherwise structuring the space of solutions, (3) automated composition of pre-existing control modules like software services, and (4) synthesis of program-like structures from partial programs or goal-specifications. Common to all of these approaches is the notion of generalized plans, or plans that include rich control structures that resemble programs. In addition, all of these approaches share the fundamental problem of evaluating whether a given control structure will be helpful in developing a scalable solution for a given class of problem instances. While these approaches have achieved promising results, many fundamental challenges remain regarding the synthesis, analysis and composition of such generalized plan.

Workshops

<div align="center">09:00-10:30am Session 1</div>

Invited talk: Foundations of Planning for LTLf and LDLf Goals
Giuseppe DeGiacomo

On Realizing Planning Programs in Domains with Dead-end States
Federico Falcone, Alfonso Emilio Gerevini and Alessandro Saetti

Bridging the Gap Between LTL Synthesis and Automated Planning
Alberto Camacho, Jorge Baier, Christian Muise and Sheila McIlraith

<div align="center">10:30-11:00am Coffee Break</div>

<div align="center">11:00am-12:30pm Session 2</div>

Learning HTN Domains using Process Mining and Data Mining techniques
José Á. Segura Muros, Raúl Pérez and Juan Fernández-Olivares

Numeric Planning via Abstraction and Policy Guided Search
León Illanes and Sheila McIlraith

Generalized Planning: Non-Deterministic Abstractions and Trajectory Constraints
Blai Bonet, Giuseppe De Giacomo, Hector Geffner and Sasha Rubin

Model-Free Conformant Planning
Roni Stern and Brendan Juba

<div align="center">12:30-02:00pm Lunch</div>

<div align="center">02:00-03:30pm Session 3</div>

Invited talk: The Dream of Lifted Planning
Scott Sanner

Service composition under probabilistic requirements
Ronen Brafman, Giuseppe De Giacomo, Massimo Mecella and Sebastian Sardina

Planning and Acting with Hierarchical Input/Output Automata
Sunandita Patra, Paolo Traverso, Malik Ghallab and Dana Nau

<div align="center">03:30-04:00pm Coffee Break</div>

<div align="center">04:00-05:30pm Session 4</div>

HOKAGE: A Heuristic Lifted Planning Algorithm for Generating Diverse Generalized Plans
Ugur Kuter and Robert P. Goldman

<div align="center">Discussion and wrap up</div>

Workshop on Knowledge Engineering for Planning and Scheduling

Lukas Chrpa, Mauro Vallati, and Tiago Vaquero

<div align="center">Monday: all day, room NSH 3305</div>

The workshop shall continue the tradition of several International Competitions on Knowledge Engineering for Planning and Scheduling (ICKEPS) and KEPS workshops. Rather than focusing only on software tools and domain encoding techniques – which are topics of ICKEPS – the workshop will cover all aspects of knowledge engineering for AI planning and scheduling.

Workshops

09:00-10:30am Session 1

Classical Planning in Latent Space: From Unlabeled Images to PDDL (and back)
Masataro Asai and Alex Fukunaga

Attribute Grammars with Set Attributes and Global Constraints as a Unifying Framework for Planning Domain Models
Roman Barták and Adrien Maillard

A PDDL Representation for Contradance Composition
Richard Freedman and Shlomo Zilberstein

10:30-11:00am Coffee Break

11:00am-12:30pm Session 2

StoryFramer: From Input Stories to Output Planning Models
Thomas Hayton, Julie Porteous, Joao Ferreira, Alan Lindsay and Jonathan Read

Extracting Incomplete Planning Action Models from Unstructured Social Media Data to Support Decision Making
Lydia Manikonda, Shirin Sohrabi, Kartik Talamadupula, Biplav Srivastava and Subbarao Kambhampati

Planning-based Scenario Generation for Enterprise Risk Management
Shirin Sohrabi, Anton Riabov and Octavian Udrea

12:30-02:30pm Lunch

02:30-03:30pm Session 3

Invited Talk: The Hitchhiker's Guide to PDDL Modeling
Christian Muise and Nir Lipovetzky

03:30-04:00pm Coffee Break

04:00-05:30pm Session 4

Domain Model Acquisition with Missing Information and Noisy Data
Peter Gregory, Alan Lindsay and Julie Porteous

Integrating Modeling and Knowledge Representation for Combined Task, Resource and Path Planning in Robotics
Simone Fratini, Tiago Nogueira and Nicola Policella

Method Composition through Operator Pattern Identification
Maurício Cecílio Magnaguagno and Felipe Meneguzzi

Heuristics and Search for Domain-independent Planning (HSDIP)

J. Benton, Nir Lipovetzky, Florian Pommerening, Miquel Ramirez, Enrico Scala, Jendrik Seipp, and Alvaro Torralba
Tuesday: room GHC 4401

Heuristics and search algorithms are the two key components of heuristic search, one of the main approaches to many variations of domain-independent planning, including classical planning, temporal planning, planning under uncertainty and adversarial planning. This workshop seeks to understand the underlying principles of current heuristics and search methods, their limitations, ways for overcoming those limitations, as well as the synergy between heuristics and search. HSDIP-17 will be a part of the ICAPS 2017 conference.

Workshops

09:00-10:30am Session 1

Invited Talk: Declarative Heuristics
Malte Helmert

On the Relationship Between State-Dependent Action Costs and Conditional Effects in Planning
Robert Mattmüller, Florian Geißer, Benedict Wright and Bernhard Nebel

Cost-Length Tradeoff Heuristics for Bounded-Cost Search
Sean Dobson and Patrik Haslum

10:30-11:00am Coffee Break

11:00am-12:30pm Session 2

Tie-Breaking in A* as Satisficing Search
Masataro Asai and Alex Fukunaga

A Graph-Partitioning Based Approach for Parallel Best-First Search
Yuu Jinnai and Alex Fukunaga

Forward Search with Backward Analysis
Shlomi Maliah, Ronen Brafman and Guy Shani

Exploiting Variance Information in Monte-Carlo Tree Search
Robert Lieck, Vien Ngo and Marc Toussaint

12:30-02:00pm Lunch

02:00-03:30pm Session 3

Beyond Forks: Finding and Ranking Star Factorings for Decoupled Search
Daniel Gnad, Valerie Poser and Joerg Hoffmann

Structural Symmetries of the Lifted Representation of Classical Planning Tasks
Silvan Sievers, Gabriele Röger, Martin Wehrle and Michael Katz

Strengthening Canonical Pattern Databases with Structural Symmetries
Silvan Sievers, Martin Wehrle and Michael Katz

From Qualitative to Quantitative Dominance Pruning for Optimal Planning
Álvaro Torralba

03:30-04:00pm Coffee Break

04:00pm Session 4

Optimal Solutions to Large Logistics Planning Domain Problems
Gerald Paul, Gabriele Röger, Thomas Keller and Malte Helmert

Equi-Reward Utility Maximizing Design in Stochastic Environments
Sarah Keren, Luis Pineda, Avigdor Gal, Erez Karpas and Shlomo Zilberstein

Workshops

Planning and Robotics (PlanRob)

Alberto Finzi and Erez Karpas

Tuesday: all day, room GHC 6115

Robotics is one of the most appealing and natural applicative area for the Planning and Scheduling (P&S) research activity, however such a natural interest seems not reflected in an equally important research production for the Robotics community. In this perspective, the aim of the PlanRob workshop is twofold. On the one hand, this workshop would constitute a fresh impulse for the ICAPS community to develop its interests and efforts towards this challenging research area. On the other hand, it aims at attracting representatives from the Robotics community to discuss their challenges related to planning for autonomous robots (deliberative, reactive, continuous planning and execution etc.) as well as their expectations from the P&S community. The PlanRob workshop aims at constituting a stable, long-term forum on relevant topics concerned with the interactions between Robotics and P&S communities where researchers could discuss about the opportunities and challenges of P&S when applied to Robotics. Started during ICAPS 2013 in Rome (Italy), followed by a second edition at ICAPS 2014 in Portsmouth (NH, USA), a third, fourth edition at ICAPS 2015 in Jerusalem (Israel) and ICAPS 2016 in London (UK), the PlanRob WS series has gathered excellent feedback from the P&S community which is also confirmed by the organisation of a specific Robotics Track from ICAPS 2014.

08:45-09:00am Opening Remarks

09:00-10:30am Session 1: Probabilistic Planning, Perception and Navigation

Towards an Architecture for Discovering Domain Dynamics: Affordances, Causal Laws, and Executability Conditions
Mohan Sridharan and Ben Meadows

Integrated Commonsense Reasoning and Probabilistic Planning
Shiqi Zhang and Peter Stone

Approximating Reachable Belief Points in POMDPs with Applications to Robotic Navigation and Localization
Kyle Wray and Shlomo Zilberstein

Human-in-the-Loop SLAM
Samer Nashed and Joydeep Biswas

IJCAI Highlight: eXplainable AI Planning
Daniele Magazzeni

10:30-11:00am Coffee Break

11:00am-12:40pm Session 2: Task and Motion Planning

STRIPS Planning in Infinite Domains
Caelan Garrett, Tomas Lozano-Perez and Leslie Kaelbling

Dynamics-Aware Reactive Planning for Unmanned Ground Vehicles to Avoid Collisions with Dynamic Obstacles on Uneven Terrains
Pradeep Rajendran, Brual C. Shah and S.K. Gupta

Joint Perception And Planning For Efficient Obstacle Avoidance Using Stereo Vision
Sourish Ghosh and Joydeep Biswas

Augmenting Planning Graphs in 2-Dimensional Dynamic Environments With Obstacle Scaffolds
Spencer Lane, Kyle Vedder and Joydeep Biswas

Deep Spatial Affordance Hierarchy: Spatial Knowledge Representation for Planning in Large-scale Environments
Andrzej Pronobis, Francesco Riccio and Rajesh Rao

12:40-02:00pm Lunch

Workshops

Invited Talk: Algorithms for Physics-based Manipulation

Siddhartha Srinivasa

02:50-03:30pm Session 3: Planning and Execution

Intra-Robot Replanning to Enable Team Plan Conditions

Philip Cooksey and Manuela Veloso

Towards CLIPS-based Task Execution and Monitoring with SMT-based Decision Optimization

Tim Niemueller, Gerhard Lakemeyer, Francesco Leofante and Erika Abraham

03:30-04:00pm Coffee Break

04:00-04:40pm Session 4: Applications

On the Application of Classical Planning to Real Social Robotic Tasks

José Carlos González Dorado, Fernando Fernández Rebollo, Ángel García Olaya and Raquel Fuente-taja Pizán

Expressing Campaign Intent to Increase Productivity of Planetary Exploration Rovers

Daniel Gaines, Gregg Rabideau, Gary Doran, Steve Schaffer, Vincent Wong, Ashwin Vasavada and Robert Anderson

04:40-05:40pm Panel: Why Isn't Planning Used More in Robotics?

Constraint Satisfaction Techniques for Planning and Scheduling (COPLAS)

Miguel A. Salido and Roman Barták

Tuesday morning: room GHC 4303

The workshop aims at providing a forum to discuss novel issues on planning, scheduling, and constraint satisfaction problems. Solutions to many real-world problems need to integrate plan synthesis capabilities with time and resource allocation, which can be efficiently managed by constraint satisfaction and OR techniques. Formulations of P&S problems as CSPs, resource and temporal global constraints, and inference techniques are of particular interest of COPLAS.

09:15am Opening

09:30-10:30am Session 1

Handling PDDL3.0 State Trajectory Constraints with Temporal Landmarks

Eliseo Marzal, Mohannad Babli, Eva Onaindia and Laura Sebastia

Evaluating the quality of tourist agendas customized to different travel styles

Jesús Ibáñez Ruiz, Laura Sebastia and Eva Onaindia

10:30-11:00am Coffee break

11:00am-12:30pm Session 2

Towards a Constraints Approach to Generating Personalised Horror Film Variants

Malcolm Mcneely, Julia Porteous, Joao Ferreira and Alan Lindsay

A Multi-Agent Approach using dynamic constraints to solve energy-aware unrelated parallel machine scheduling problem with energy-dependent and sequence-dependent setup time

Giancarlo Nicolo, Miguel A. Salido, Sergio Ferrer, Adriana Giret and Federico Barber

Mode List vs Activity List for the Multi-mode Resource Constrained Project Scheduling Problem

Daniel Morillo, Federico Barber and Miguel A. Salido

Workshops

User Interfaces and Scheduling and Planning (UISP)

Jeremy D. Frank, Richard G. Freedman, Amadeo Cesta, Subbarao Kambhampati, David Kortenkamp, Ronald P. A. Petrick, Kartik Talamadupula, and Shlomo Zilberstein

Tuesday: all day, room NSH 3305

The UISP workshop will be held at the ICAPS 2017 conference, focusing on bridging the gap between automated planning and scheduling technologies and user interface technologies that can both support them, and also benefit from them.

08:15-08:30am Opening Remarks

Invited Talk: User Interfaces for eXplainable Planning
Daniele Magazzeni

09:30-10:30am Session 1: UISP for Plan/Domain Modeling

RADAR-A Proactive Decision Support System for Human-in-the-Loop Planning
Sailik Sengupta, Tathagata Chakraborti, Sarath Sreedharan, Satya Gautam Vadlamudi, Subbarao Kambhampati

WEB PLANNER: A Tool to Develop Classical Planning Domains and Visualize Heuristic State-Space Search
Maurício Cecílio Magnaguagno, Ramon Fraga Pereira, Martin Duarte Móre and Felipe Meneguzzi

In-Situ Domain Modeling with Fact Routes
Daniel Bryce, Pete Bonasso, Khalid Adil, Scott Bell, David Kortenkamp

10:30-11:00am Coffee Break

11:00am-12:00pm Session 2: UISP for Plan Execution

Augmented Workspace for Human-in-the-Loop Plan Execution
Tathagata Chakraborti, Sarath Sreedharan, Anagha Kulkarni, Subbarao Kambhampati

CHAP-E: A Plan Execution Assistant for Pilots
J. Benton, David Smith, John Kaneshige, Leslie Keely

Alternate Realities for Mission Operations Plan Execution
Pete Bonasso, David Kortenkamp, Blair MacIntyre, Bryn Wolf

12:00-12:30pm Session 3: Short Paper Talks

Session Analysis using Plan Recognition
Reuth Mirsky, Kobi Gal, David Tolpin

Workflow Complexity for Collaborative Interactions: Where are the Metrics?-A Challenge
Kartik Talamadupula, Biplav Srivastava, Jeffrey O. Kephart

12:30-02:00pm Lunch

Invited Talk: So You Want to Field Your Intelligent Planning and Scheduling System? Then Suck It Up!
Dick Stottler

03:30-04:00pm Coffee Break

04:00-04:45pm Panel Discussion

The ICAPS Community and Good UI: Making Technologies More Accessible and Improving UI Technology
Panelists: Pete Bonasso, Jim Boerkoel, Lukas Chrpa, Christian Muise, Dick Stottler, Kartik Talamadupula

04:45-05:00pm Closing Remarks

Workshops

Integrated Execution of Planning and Acting (IntEx)

Mark 'Mak' Roberts, Sara Bernardini, Tim Niemueller, Tiago Vaquero

Tuesday morning: room NSH 3002

Automated planners are increasingly being integrated into online execution systems. The integration may, for example, embed a domain-independent temporal planner in a manufacturing system (e.g., the Xerox printer application) or autonomous vehicles. The integration may resemble something more like a "planning stack" where an automated planner produces an activity or task plan that is further refined before being executed by a reactive controller (e.g., robotics). Or, the integration may be a domain-specific policy that maps states to actions (e.g., reinforcement learning). Online learning may or may not be involved, and may include adjusting or augmenting the model, determining when to repair versus replan, learning to switch policies, etc. A specific focus of these integrations involves online deliberation, bringing to the foreground concerns over how much computational effort planning should invest over time. In any of these systems, a planner generates action sequences that are eventually dispatched to an executive, yet taking action in a dynamic world rarely proceeds according to plan. When planning assumptions are challenged during execution, it raises a number of interesting questions about how the system should respond. Is the "acting" side of the system responsible for a response or the "planning" side? Or do the two need to cooperate and how much? When should the activity planner abandon or preempt the current goals? Should the task planner repair a plan or replan from scratch? Should the executive adjust its current policy, switch to a new one, or learn a new policy from more relevant experience?

08:30-10:30am Session 1

Autonomous Search-Detect-Track for Small UAVs
Bob Morris, Anjan Chakrabarty, Joshua Baculi, Xavier Bouyssounouse, and Rusty Hunt

k-Robust Multi-Agent Path Finding
Dor Atzmon, Roni Stern, Ariel Felner, Roman Bartak, Neng-Fa Zhou and Glenn Wagner

Position 1 – Competition discussion

An Architecture for Integrated Timeline Planning and Model-based Execution
Tiago Nogueira and Simone Fratini

Integrating Execution and Rescheduling
Jeremy Frank

10:30-11:00am Coffee Break

11:00am-12:30pm Session 2

Automated Planning with Goal Reasoning in Minecraft
Mark Roberts, Wiktor Piotrowski, Pyrce Bevan, David Aha, Maria Fox, Derek Long, and Daniele Magazzeni

Goal Reasoning as Multilevel Planning
Alison Paredes and Wheeler Ruml

Towards Planning With Hierarchies of Learned Markov Decision Processes
John Winder, Shawn Squire, Matthew Landen, Stephanie Milani and Marie desJardins

Position 2 – Planning as a compositional service?

Detailed Schedule - Wednesday (June 21, 2017)

08:15am	**Opening Remarks (room: GHC 4401 Rashid)**
08:30am	**Invited Talk - Sylvie Thiébaux: 'Energy Systems: Challenges and Opportunities for ICAPS' (room: GHC 4401 Rashid)**
09:30am-09:35am	**Break**

Optimal Planning (Session 1a)
Room: GHC 4401   Time: 09:35am-10:35am
Session Chair: Erez Karpas

A Comparison of Cost Partitioning Algorithms for Optimal Classical Planning
Jendrik Seipp, Thomas Keller and Malte Helmert

A State Space Acyclicity Property for Exponentially Tighter Plan Length Bounds
Mohammad Abdul Aziz, Charles Gretton and Michael Norrish

The Two-edged Nature of Diverse Action Costs
Gaojian Fan, Martin Mueller and Robert Holte

Motion Planning and Control (Session 1b)
Room: GHC 6115   Time: 09:35am-10:35am
Session Chair: Daniele Magazzeni

Efficient Decision-Theoretic Target Localization
Louis Dressel and Mykel Kochenderfer

Efficient motion planning for problems lacking optimal substructure
Oren Salzman, Brian Hou and Siddhartha Srinivasa

Plan-Time Multi-Model Switching for Motion Planning
Breelyn Kane Styler and Reid Simmons

10:35am-11:00am	**Coffee Break**

Theory of Search (Session 2a)
Room: GHC 4401   Time: 11:00am-12:15pm
Session Chair: Dana Nau

Completeness of Online Planners for Partially Observable Deterministic Tasks
Blai Bonet, Gabriel Formica and Melecio Ponte

Plan-Verification for HTN Planning Problems
Gregor Behnke, Daniel Holler and Susanne Biundo

Unsolvability Certificates for Classical Planning
Salome Eriksson, Gabriele Röger and Malte Helmert

An Investigation of Phase Transitions in Single-Machine Scheduling Problems
Zhihui Wang, Bryan O'Gorman, Tony Tran, Eleanor Rieffel, Jeremy Frank and Minh Do

Applications I: Smart Cities (Session 2b)
Room: GHC 6115   Time: 11:00am-12:15pm
Session Chair: Sara Bernardini

Augmenting Decisions of Taxi Drivers through Reinforcement Learning for Improving Revenues
Tanvi Verma, Pradeep Varakantham, Sarit Kraus and Hoong Chuin Lau

Embedding Automated Planning within Urban Traffic Management Operations
Lee Mccluskey and Mauro Vallati

Incentivizing the Use of Bike Trailers for Dynamic Repositioning in Bike Sharing Systems
Supriyo Ghosh and Pradeep Varakantham

Automated Planning and Control for High-Density Parking Lots
Pedro M. d'Orey, Jose Azevedo and Michel Ferreira

12:15pm-02:00pm	**Lunch**

Detailed Schedule - Wednesday (June 21, 2017)

Heuristics I (Session 3a)

Room: GHC 4401   Time: 02:00pm-03:15pm

Session Chair: Gabriele Röger

An Experimental Study of Influence of Modeling and Solving Techniques on Performance of a Tabled Logic

Roman Bartak and Jindrich Vodrazka

Compressed Path Databases with Ordered Wildcard Substitutions

Matteo Salvetti, Adi Botea, Alessandro Saetti and Alfonso Gerevini

Tailoring Pattern Databases for Unsolvable Planning Instances

Simon Stahlberg

Abstraction Heuristics, Cost Partitioning and Network Flows

Florian Pommerening, Malte Helmert and Blai Bonet

Multi Agent Planning (Session 3b)

Room: GHC 6115   Time: 02:00pm-03:20pm

Session Chair: Ronen Brafman

Minimizing Maximum Regret in Commitment Constrained Sequential Decision Making

Qi Zhang, Satinder Singh and Edmund Durfee

Multi-Agent Ergodic Coverage with Obstacle Avoidance

Hadi Salman, Elif Ayvali and Howie Choset

Multiagent Online Planning with Nested Beliefs and Dialogue

Filippos Kominis and Hector Geffner

Using Hierarchical Constraints to Avoid Conflicts in Multi-Agent Pathfinding

Thayne T. Walker, Nathan Sturtevant and David Chan

03:20pm-03:45pm   **Coffee Break**

Heuristics II (Session 4a)

Room: GHC 4401   Time: 3:45pm-4:50pm

Session Chair: Nathan Sturtevant

Boosting search guidance in problems with semantic attachments

Sara Bernardini, Maria Fox, Derek Long and Chiara Piacentini

Beyond Red-Black Planning: Limited-Memory State Variables

Patrick Speicher, Marcel Steinmetz, Daniel Gnad, Joerg Hoffmann and Alfonso Emilio Gerevini

Critical-Path Dead-End Detection vs. NoGoods: Offline Equivalence and Online Learning

Marcel Steinmetz and Joerg Hoffmann

Planning Time to Think: Metareasoning for Online Planning with Durative Actions

Bence Cserna, Wheeler Ruml and Jeremy Frank

Applications II (Session 4b)

Room: GHC 6115   Time: 3:45pm-4:45pm

Session Chair: Hana Rudova

New Results for the GEOCAPE Observation Scheduling Problem

Philippe Laborie and Bilal Messaoudi

On the Exploitation of Automated Planning for Reducing Machine Tools Energy Consumption Between Manufacturing Operations

Simon Parkinson, Andrew Longstaff, Simon Fletcher, Mauro Vallati and Lukas Chrpa

Tackling Large-scale Home Health Care Delivery Problem with Uncertainty

Cen Chen, Zachary Rubinstein, Stephen Smith and Hoong Chuin Lau

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4:50pm-05:50pm   **Panel: Planning in the Data-Centric Age. Moderator: Subbarao Kambhampati (Room: GHC 4401)**

06:00pm-08:00pm   **Posters and Demos (Room: Rangos, Cohon University Center)**

Thursday (June 22, 2017)

08:30am	**Invited Talk - Manuela Veloso: 'Planning for Human-AI Interaction in Autonomous Mobile Robots' (room: GHC 4401)**

09:30am-09:35am	**Break**

Learning Heuristics (Session 5a)

Room: GHC 4401   Time: 9:35am-10:30am

Session Chair: Alan Fern

Learning to Speed Up Query Planning in Graph Databases

Mohammad Hossain Namaki, F A Rezaur Rahman Chowdhury, Md Rakibul Islam, Janardhan Rao Doppa and Yinghui Wu

Online Heuristic-Function Refinement: Learning Conjunctions for Partial Delete Relaxation

Maximilian Fickert and Joerg Hoffmann

Learning to Avoid Local Minima in Planning for Static Environments

Shivam Vats, Venkatraman Narayanan and Maxim Likhachev

Privacy and Social Law (Session 5b)

Room: GHC 6115   Time: 9:35am-10:35am

Session Chair: Shlomo Zilberstein

Automated Verification of Social Law Robustness in STRIPS

Erez Karpas, Alexander Shleyfman and Moshe Tennenholtz

Increased Privacy with Reduced Communication in Multi-Agent Planning

Guy Shani, Ronen Brafman and Shlomi Maliah

The Limits of Strong Privacy Preserving Multi-Agent Planning

Michal Stolba, Jan Tozicka and Antonin Komenda

10:35am-11:00am	**Coffee Break**

Heuristics III (Session 6a)

Room: GHC 4401   Time: 11:00am-12:15pm

Session Chair: Blai Bonet

Adapting Novelty to Classical Planning as Heuristic Search

Michael Katz, Nir Lipovetzky, Dany Moshkovich and Alexander Tuisov

Exploration Among and Within Plateaus in Greedy Best-First Search

Masataro Asai and Alex Fukunaga

Sufficient Conditions for Node Expansion in Bidirectional Heuristic Search

Jurgen Eckerle, Jingwei Chen, Nathan Sturtevant, Sandra Zilles and Robert Holte

Accelerating SAT Based Planning with Incremental SAT Solving

Stephan Gocht and Tomas Balyo

Uncertainty (Session 6b)

Room: GHC 6115   Time: 11:00am-12:15pm

Session Chair: Florent Teichteil-Koenigsbuch

Approximately-Optimal Queries for Planning in Reward-Uncertain Markov Decision Processes

Shun Zhang, Edmund Durfee and Satinder Singh

Occupation Measure Heuristics for Probabilistic Planning

Felipe Trevizan, Sylvie Thiébaux and Patrik Haslum

State-Regularized Policy Search for Linearized Dynamical Systems

Hany Abdulsamad, Oleg Arenz, Jan Peters and Gerhard Neumann

Analytic Decision Analysis via Symbolic Dynamic Programming for Parameterized Hybrid MDPs

Shamin Kinathil, Harold Soh and Scott Sanner

12:15pm-02:00pm	**Lunch**

Thursday (June 22, 2017)

Temporal Planning I (Session 7a)

Room: GHC 4401   Time: 02:00pm-02:40pm

Session Chair: Minh Do

A Temporal Relaxed Planning Graph Heuristic for Planning With Envelopes

Amanda Coles and Andrew Coles

Dynamic Controllability of Controllable Conditional Temporal Problems with Uncertainty

Jing Cui and Patrik Haslum

Human Robot Interation (Session 7b)

Room: GHC 6115   Time: 02:00pm-02:40pm

Session Chair: Kartik Talamadupula

Dealing with On-line Human-Robot Negotiations in Hierarchical Agent-based Task Planner

Eugenio Sebastiani, Raphael Lallement, Luca Iocchi and Rachid Alami

Short-Term Human Robot Interaction through Conditional Planning and Execution

Valerio Sanelli, Michael Cashmore, Luca Iocchi and Daniele Magazzeni

02:40pm-02:45pm	**Break**
02:45pm-04:05pm	**ICAPS award session (Room: GHC 4401)**
04:05pm-04:30pm	**Coffee Break**
04:30-05:30pm	**Community Meeting (Room: GHC 4401)**
06:00pm	**Conference Banquet (Carnegie Museum of Natural History)**

Friday (June 23, 2017)

| 08:30 | **Invited Talk - Milind Tambe 'How Can AI be Used for Social Good? Key Research Challenges, Applications, and Results' (room GHC 4401)** |

| 09:30-09:35 | **Break** |

Temporal Planning II (Session 8a)

Room: GHC 4401   Time: 09:35am-10:35am

Session Chair: Andrew Coles

A New Approach to Temporal Planning with Rich Metric Temporal Properties

Son To, Benjamin Johnson, Mark Roberts, Thomas Apker and David Aha

Opportunistic Planning in Autonomous Underwater Missions

Michael Cashmore, Maria Fox, Derek Long, Daniele Magazzeni, and Bram Ridder

Complexity of Timeline-based Planning

Nicola Gigante, Angelo Montanari, Marta Cialdea Mayer and Andrea Orlandini

Multi Robot Planning (Session 8b)

Room: GHC 4307   Time: 09:35am-10:35am

Session Chair: Ron Alford

Any-Angle Pathfinding For Multiple Agents Based On SIPP Algorithm

Konstantin Yakovlev and Anton Andreychuk

Cooperative Multi-Robot Sampling-Based Motion Planning with Dynamics

Duong Le and Erion Plaku

Integrating Mission and Task Planning in an Industrial Robotics Framework

Matthew Crosby, Francesco Rovida, Volker Krueger and Ron Petrick

| 10:35am-11:00am | **Coffee Break** |

Tractable Inference (Session 9a)

Room: GHC 4401   Time: 11:00am-12:15pm

Session Chair: Patrik Haslum

Automatic Extraction of Axioms for Planning

Shuwa Miura and Alex Fukunaga

Stubborn Sets for Fully Observable Nondeterministic Planning

Dominik Winterer, Yusra Alkhazraji, Michael Katz and Martin Wehrle

Symmetry Breaking in Star-Topology Decoupled Search

Daniel Gnad, Alvaro Torralba, Alexander Shleyfman and Joerg Hoffmann

A polynomial planning algorithm that beats FF and LAMA

Nir Lipovetzky and Hector Geffner

Uncertainty and Robotics (Session 9b)

Room: GHC 4307   Time: 11:00am-12:15pm

Session Chair: Matthijs Spaan

An Operational Method Toward Efficient Navigation Policies for Humanoid Robots

Ludovic Hofer and Quentin Rouxel

Multi-objective Policy Generation for Mobile Robots under Probabilistic Time-Bounded Guarantees

Bruno Lacerda, David Parker and Nick Hawes

Planning with Abstract Markov Decision Processes

Nakul Gopalan, Marie desJardins, Michael L. Littman, James MacGlashan, Shawn Squire, Stefanie Tellex, John Winder and Lawson L.S. Wong

Hybrid Task Planning Grounded in Belief: Constructing Physical Copies of Simple Structures

Roderic Grupen, Michael W. Lanighan and Takeshi Takahashi

| 12:15pm-02:00pm | **Lunch** |

Friday (June 23, 2017)

Learning and Planning I (Session 10a)

Room: GHC 4401   Time: 02:00pm-03:15pm

Session Chair: Daniel Borrajo

Declarative Programming and Relational Learning for Reasoning with and Learning Affordances

Mohan Sridharan and Ben Meadows

Framer: Planning Models from Natural Language Action Descriptions

Alan Lindsay, Jonathon Read, Joao Ferreira, Thomas Hayton, Julie Porteous and Peter Gregory

Unsupervised learning of planning tasks

Javier Segovia-Aguas, Sergio Jimenez and Anders Jonsson

Initial Results on Generating Macro Actions from a Plan Database for Planning on Autonomous Mobile Robots

Till Hofmann, Tim Niemueller and Gerhard Lakemeyer

Applications III (Session 10b)

Room: GHC 4307   Time: 02:00pm-03:20pm

Session Chair: Eva Onaindia

Coping with Large Traffic Volumes in Schedule-Driven Traffic Signal Control

Hsu-Chieh Hu and Stephen Smith

Multi-objective optimization in a job shop with energy costs through hybrid evolutionary techniques

Miguel Angel Gonzalez Fernandez, Angelo Oddi and Riccardo Rasconi

Online Repositioning in Bike Sharing Systems

Meghna Lowalekar, Pradeep Varakantham, Supriyo Ghosh, Sanjay Dominik Jena and Patrick Jaillet

Submodular Function Maximization for Group Elevator Scheduling

Srikumar Ramalingam, Arvind Raghunathan and Daniel Nikovski

03:20pm-03:45pm   **Coffee Break**

Path Planning (Session 11a)

Room: GHC 4401   Time: 03:45pm-04:40pm

Session Chair: John Bresina

Heuristic Search on Graphs with Existence Priors for Expensive-to-Evaluate Edges

Venkatraman Narayanan and Maxim Likhachev

Path Planning for Multiple Agents Under Uncertainty

Glenn Wagner and Howie Choset

Improving MPGAA* for Extended Visibility Ranges

Carlos Hernández Ulloa and Jorge Baier

Learning and Planning II (Session 11b)

Room: GHC 4307   Time: 03:45pm-04:25pm

Session Chair: Lukas Chrpa

The IBaCoP Planning System: Instance-Based Configured Portfolios

Isabel Cenamor, Tomas de la Rosa, and Fernando Fernandez

Performance Modelling of Planners from Homogeneous Problem Sets

Performance Modelling of Planners from Homogeneous Problem Sets

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04:40pm   **Adjourn**