UC San Diego
JACOBS SCHOOL OF ENGINEERING

Vikas Dhiman <vdhiman@eng.ucsd.edu>

Invitation to talk at a ICRA'21 workshop on Safe Robot Control with Learned Motion and Environment Models

3 messages

Shumon Koga <skoga@eng.ucsd.edu> Thu, Nov 5, 2020 at 7:45 PM
To: ames@caltech.edu
Cc: Vikas Dhiman <vdhiman@eng.ucsd.edu>, Nikolay Atanasov <natanasov@eng.ucsd.edu>

Dear Prof. Ames,

I hope you and your family are well in these challenging times.

We are reaching out to invite you to be a speaker at our proposed **workshop on "Safe Robot Control with Learned Motion and Environment Models" during ICRA'21 in Xi'an, China, May 30 - June 5, 2021**: https://vikasdhiman.info/safe-control-icra21/

The goal of the workshop is to bring together researchers from **robotics, control theory, and machine learning** to examine the challenges and opportunities in guaranteeing safety and stability for robot systems with uncertain or learned dynamics models operating in a priori unknown environments. You can find more details in the call for papers below.

We would love to have you onboard because your experience on safety-critical control will provide a unique perspective to the audience.

We understand that it is too early to commit to a presentation that is half an year into the future but even a tentative response before the workshop proposal deadline on Nov. 15th would be very helpful.

Thank you for your consideration!

Best regards,

Shumon Koga, Postdoc, University of California San Diego
Vikas Dhiman, Postdoc, University of California San Diego
Nikolay Atanasov, Assistant Professor, University of California San Diego

==========
==========

Call for Papers - ICRA 2021 Workshop:

Safe Robot Control with Learned Motion and Environment Models

International Conference on Robotics and Automation - May 30, 2021, Xi'an, China

Website: https://vikasdhiman.info/safe-control-icra21/

OVERVIEW:

Guaranteeing safety and stability is crucial for effective deployment of robots. Research in control theory has enabled techniques with theoretical guarantees based on model predictive control, reference governor design, Hamilton-Jacobi reachability, control Lyapunov and barrier functions, and contraction theory. Existing techniques, however,

predominantly assume that task safety constraints and robot motion dynamics are known, which is infeasible in unstructured and dynamic real-world environments. An aerial vehicle aiding in disaster response has to operate in an unpredictable environment, subject to extreme disturbances. Similarly, a walking robot providing last-mile delivery has to traverse changing terrains and negotiate with pedestrian traffic.

With recent progress in machine learning we can learn robot dynamics or environment models from sensory data. Gaussian Process regression and Koopman Operator theory have shown promise in estimating robot dynamics models. Deep neural network models have enabled impressive results in 3D reconstruction from visual data. Although empirically impressive, these machine learning techniques, however, do not provide guarantees for safety.

This workshop seeks to bring together experts from two communities -- control theory and machine learning -- and highlight the cutting-edge research in their intersection. We will feature talks from both the fields with an emphasis on safe robot control in uncertain environments.

CALL FOR PAPERS:

We invite submissions from a broad range of topics that investigate the formal safety of robots while dealing with uncertainties introduced when the robot dynamics are learned or the environment state is estimated. We provide a non-exhaustive list of topics that might be of interest to the target audience for this workshop:
Control-theoretic techniques for safe task execution, including control barrier functions, reachability analysis, model predictive control, reference governor control, contraction theory.
Machine learning techniques for safe task execution, including model-based reinforcement learning, robot dynamics model learning and system identification, learning 3-D environment shape and dynamics.
Priority will be given to papers that bridge the gap between the two areas to provide safety and stability guarantees for systems with learned motion and environment dynamics.

SCHEDULE (tentative):

Time	Topic
08:45-09:00 AM	Registration, welcome, and opening remarks
09:00-09:30 AM	Invited talk: TBD
09:30-10:00 AM	Invited talk: TBD
10:00-10:30 AM	Poster session
10:30-11:00 AM	Coffee break
11:00-11:30 AM	Poster session
11:30-12:00 PM	Invited talk: TBD
12:00-12:30 PM	Invited talk: TBD
12:30-02:00 PM	Lunch break
02:00-02:30 PM	Invited talk: TBD
02:30-03:00 PM	Invited talk: TBD
03:00-03:30 PM	Coffee break and Poster session
03:30-04:00 PM	Poster session
04:00-04:30 PM	Invited talk: TBD
04:30-05:00 PM	Afternoon wrap-up: Panel discussion and closing remarks

==========
==========

Aaron D. Ames <ames@caltech.edu> Tue, Nov 10, 2020 at 10:23 AM
To: Shumon Koga <skoga@eng.ucsd.edu>
Cc: Vikas Dhiman <vdhiman@eng.ucsd.edu>, Nikolay Atanasov <natanasov@eng.ucsd.edu>

Hi Shumon,

Apologies for the delay on this---I would be happy to give a talk at the workshop.

Best,

Aaron

Aaron D. Ames
Bren Professor
Mechanical and Civil Engineering
Control and Dynamical Systems
California Institute of Technology

[Quoted text hidden]

Shumon Koga <skoga@eng.ucsd.edu> Tue, Nov 10, 2020 at 10:48 AM
To: "Aaron D. Ames" <ames@caltech.edu>
Cc: Vikas Dhiman <vdhiman@eng.ucsd.edu>, Nikolay Atanasov <natanasov@eng.ucsd.edu>

Dear Prof. Ames,

Thank you very much for your response. We are very happy that you are onboard. We will keep you updated the progress of our workshop organization.

Best,
Shumon
[Quoted text hidden]