第222回
総研セミナー開催案内

下記のとおり第２２２回総研セミナーを開催いたします。今回は、インテリジェントロボティクスセンター主催の総研セミナーとなります。本セミナーには、本学の教職員、学生、その他どなたでも自由に参加できます。是非多くの方にご参集頂けますようご案内申し上げます。

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日時：2024年10月23日（水）14:00 ～ 15:00
会場：10号館4階406室 (MSE_HUB)
ZOOM：https://tcu-ac-jp.zoom.us/j/81349395922

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Title: Nonlinear Data-Driven Predictive Control Based on Koopman Operators and quasi-LPV Models

Speaker: Professor Herbert Werner, Hamburg University of Technology

Abstract:

Due to their considerable practical importance, fast nonlinear predictive control schemes have been receiving considerable attention over the last two decades. In this talk we present a recently developed, highly efficient approach to nonlinear MPC that is based on a quasi-Linear Parameter-Varying (qLPV) model of the plant. The nonlinear optimization problem is solved by iteratively optimizing the input sequence for an LTV system (using warm starts, this typically amounts to solving one QP per sampling period). Stability can be guaranteed via terminal constraints.

When a first-principles model of the nonlinear plant is available, a suitable qLPV model can be constructed using a velocity-linearisation approach. Alternatively, when a first-principles model is not available, we present a data-driven approach to construct a qLPV model that is based on a truncated Koopman operator representation, which can be updated online. The real-time capability of the proposed method is illustrated with experimental results.

Biography:

Herbert Werner received the Dipl-Ing degree from the Ruhr University Bochum, Germany, the MPhil degree from the University of Strathclyde, UK, and the PhD degree from the Tokyo Institute of Technology, Japan, in 1989, 1991 and 1995, respectively. From 1995-98 he was with the Control Engineering Laboratory at the Ruhr University Bochum, Germany, and from 1999-2002 with the Control Systems Centre at UMIST, UK. From 2002 to 2024 Herbert Werner was head of the Institute of Control Systems at the Hamburg University of Technology, Germany. His research interests include linear systems theory, robust and gain-scheduled control systems, networked control systems, and modelling and control of uncertain, nonlinear and time-varying systems.

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