NEW HORIZON COLLEGE OF ENGINEERING

Autonomous College Permanently Affiliated to VTU, Approved by AICTE & UGC
Accredited by NBA and NAAC with Grade "A"
New Horizon Knowledge Park, Ring Road, Bellandur Post, Bengaluru 560 103

Department of Electrical and Electronics Engineering

IEEE Power Electronics Society NHCE Student Branch Chapter

Geo-Code is SBC66131

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IEEE POWER ELECTRONICS SOCIETY
Bangalore Chapter

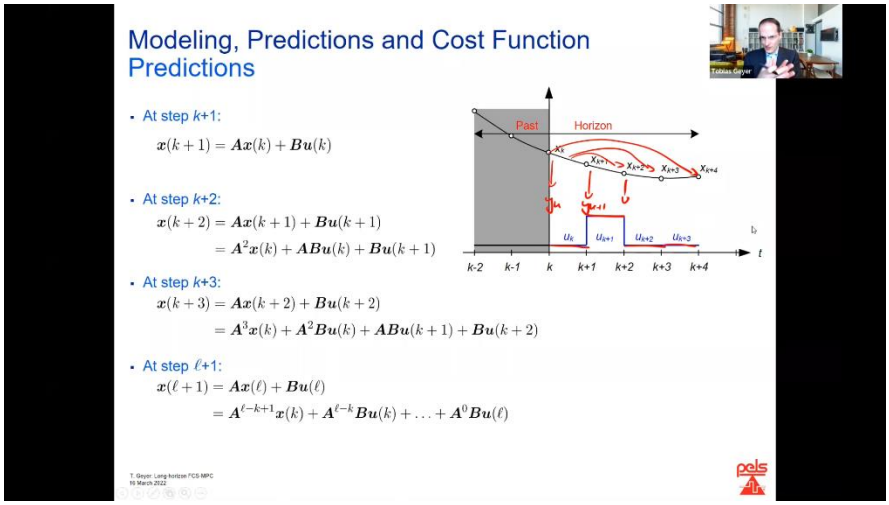
IEEE IES Bangalore Chapter

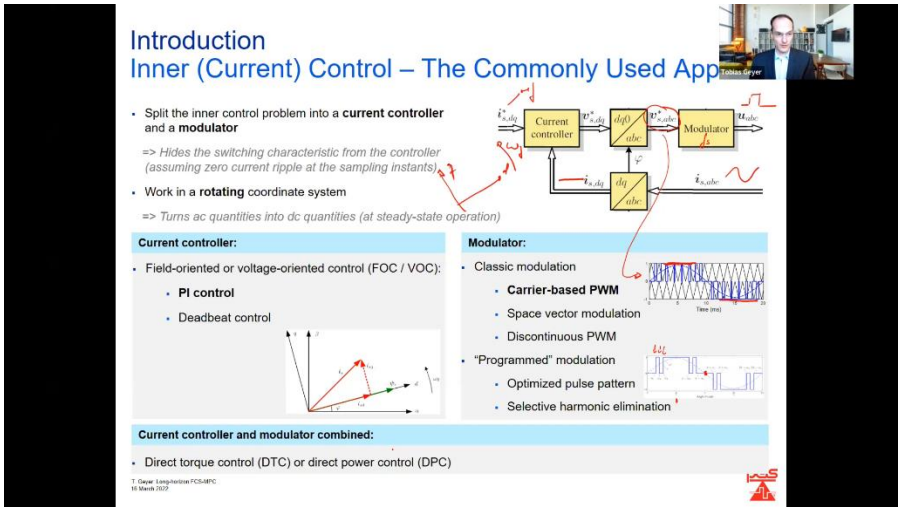
Jointly organised

Title	**Distinguished Lecture Program on "Long-horizon finite control set model predictive control: theory, implementation and applications"**	
Department	Electrical and Electronics Engineering	
Date	From: 16.03.2022	To: 16.03.2022
Time	From: 06.00 PM	To: 08.00 PM
Brief Description (4-5 Lines Max)	The IEEE PELS NHCE Student Branch Chapter from Department of Electrical and Electronics Engineering, New Horizon College of Engineering, Bengaluru is organized the Distinguished Lecture Program on "Long-horizon finite control set model predictive control: theory, implementation and applications" on 16th March 2022, Wednesday from 06.00 PM to 08.00 PM in association with IEEE PELS Bangalore Chapter. Dr. Tobias Geyer, ABB Medium - Voltage Drives, Switzerland and Stellenbosch University, South Africa acted as a resource person. The outcome of the programme is to bring the researchers and academic experts from reputed institutes of our country to a collective gathering for exchanging and sharing the knowledge about the recent developments and research challenges in model predictive control in power electronics: a critical review and recent industrial products. This lecture provides an introduction to finite control set model predictive control (FCS-MPC), which is very popular in academia. Although only a one-step horizon is usually used, FCS-MPC performs particularly well when adopting long prediction horizons. To solve the underlying integer optimization problem, a tailored branch-and-bound method will be presented, which can be implemented on an FPGA with real-time guarantees. Application examples will be discussed, including converters with LC filters, which necessitate the use of long horizons. The lecture concludes with a critical assessment of FCS-MPC that identifies some of the obstacles to be addressed to make FCS-MPC a success not only in academia but also in industry. The entire session is very informative and enthusiastic manner in the area of power electronics industry. The eminent expert from the ABB Medium - Voltage Drives, Switzerland and Stellenbosch University, South Africa delivered the lecture and his talk has been very well received by the 144 participants. Event Link: https://www.youtube.com/watch?v=57ID89_hGWM	

Images

IEEE POWER ELECTRONICS SOCIETY
Powering a Sustainable Future
Distinguished Lecturer Seminar
Long-Horizon Finite Control Set Model Predictive Control: Theory, Implementation and Applications
Tobias Geyer
ABB Medium-Voltage Drives
ETH Zurich and Stellenbosch University
16 March 2022


Modeling, Predictions and Cost Function
Predictions
At step k+1:
$x(k+1) = Ax(k) + Bu(k)$
At step k+2:
$x(k+2) = Ax(k+1) + Bu(k+1)$
$= A^2x(k) + ABu(k) + Bu(k+1)$
At step k+3:
$x(k+3) = Ax(k+2) + Bu(k+2)$
$= A^3x(k) + A^2Bu(k) + ABu(k+1) + Bu(k+2)$
At step ℓ+1:
$x(\ell+1) = Ax(\ell) + Bu(\ell)$
$= A^{\ell-k+1}x(k) + A^{\ell-k}Bu(k) + \ldots + A^0Bu(\ell)$
Past
Horizon
k-2
k-1
k
k+1
k+2
k+3
k+4


Introduction
Inner (Current) Control – The Commonly Used App
Split the inner control problem into a current controller and a modulator
=> Hides the switching characteristic from the controller (assuming zero current ripple at the sampling instants)
Work in a rotating coordinate system
=> Turns ac quantities into dc quantities (at steady-state operation)
Current controller
Modulator
Current controller:
Field-oriented or voltage-oriented control (FOC / VOC):
PI control
Deadbeat control
Modulator:
Classic modulation
Carrier-based PWM
Space vector modulation
Discontinuous PWM
"Programmed" modulation
Optimized pulse pattern
Selective harmonic elimination
Current controller and modulator combined:
Direct torque control (DTC) or direct power control (DPC)

NEW HORIZON COLLEGE OF ENGINEERING

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

IEEE Power Electronics Society NHCE Student Branch Chapter

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IEEE PELS & IEEE IES Bangalore Chapter

IEEE POWER ELECTRONICS SOCIETY Bangalore Chapter | IEEE IES Bangalore Chapter | IEEE NHCE STUDENT BRANCH

GEO-CODE: SBC66131

Jointly Organising

IEEE PELS DISTINGUISHED LECTURE

on

LONG-HORIZON FINITE CONTROL SET MODEL PREDICTIVE CONTROL: THEORY, IMPLEMENTATION AND APPLICATIONS

SPEAKER

Dr. Tobias Geyer

Professor

ABB Medium - Voltage Drives, Switzerland and

Stellenbosch University, South Africa

CONVENOR

Dr. M. Mahesh

Professor and HOD - Dept. of EEE, NHCE

FACULTY COORDINATOR

Dr. Vinoth Kumar K

Associate Professor, Dept. of EEE, NHCE,
& IEEE PELS NHCE SBC Advisor

CONTACT

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Online Platform: zoom

Registration link: https://forms.gle/7Cexby11RDYAQStEA

Last Date of Registration: 15th March 2022

Free Registration

E-certificates will be provided to all the Participants

16th March 2022 @ 06:00 PM - 08:00 PM IST