



HUMAN-CENTERED **ROBOTICS** LAB

Department of Mechatronics & Control Engineering,
University of Engineering & Technology, Lahore-54890, Pakistan



WORKSHOP ON ETHERCAT WITH ITS APPLICATIONS IN ROBOTICS

The workshop will provide hands-on training to the participants on EtherCAT technology using Beckhoff's TwinCAT software. EtherCAT is a protocol that brings the power and flexibility of ethernet to the world of industrial automation, motion control, real-time control systems, and data acquisition systems.

The following topics will be covered:

- Introduction to EtherCAT and TwinCAT
- Basic PLC programming
- Introduction to TwinCAT eXtended Automation
- PLC Programming in TwinCAT (Ladder Logic, Structure Text, Function Block)
- Motion Control Module of TwinCAT
- Implementation of Motion Control on BLDC motors.
- Introduction to Robotics and MATLAB's Simscape toolbox.
- Demonstration of path planning and pick-and-place application on state-of-the-art 7 DOF CoBot.

Day 1			
Time	Duration	Content	Trainer
09:30 AM – 11:00 AM	1.5 Hrs	<ul style="list-style-type: none"> • Introduction to TwinCAT3 and XAR • System Configuration • Writing PLC Program on IDE 	Trainer: Mr. M. Ahsan Naeem & Mr. M. Bilal
11:00 AM – 12:30 PM	1.5 Hrs	<ul style="list-style-type: none"> • Variables and Data Types • Ladder Logic Programming • Introduction to Structure Text Programming 	Trainer: Mr. M. Ahsan Naeem & Mr. M. Bilal
12:30 PM – 1:30 PM LUNCH BREAK			
1:30 PM – 3:00 PM	1.5 Hrs	<ul style="list-style-type: none"> • Hands-on Programming on Computer 	Trainer: Mr. M. Ahsan Naeem & Mr. M. Bilal
3:00 PM – 3:20 PM BREAK			
3:20 PM – 4:20 PM	1 Hr	<ul style="list-style-type: none"> • Structure Text Programming 	Trainer: Mr. M. Ahsan Naeem & Mr. M. Bilal



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Day 2			
Time	Duration	Content	Trainer
09:30 AM – 11:00 AM	1.5 Hrs	<ul style="list-style-type: none"> Introduction to Robotics 	Trainer: Dr. Naseer Ahmad
11:00 AM – 12:30 PM	1.5 Hrs	<ul style="list-style-type: none"> MATLAB's Simscape Toolbox 	Trainer: Dr. Naseer Ahmad
12:30 PM – 1:30 PM LUNCH BREAK			
1:30 PM – 3:00 PM	1.5 Hrs	<ul style="list-style-type: none"> Structure Text Programming Visualization Tools of IDE 	Trainer: Mr. M. Ahsan Naeem & Mr. M. Bilal
3:00 PM – 3:20 PM BREAK			
3:20 PM – 4:20 PM	1 Hr	<ul style="list-style-type: none"> Hands-on Programming on Computer 	Trainer: Mr. M. Ahsan Naeem & Mr. M. Bilal

Day 3			
Time	Duration	Content	Trainer
09:30 AM – 11:00 AM	1.5 Hrs	<ul style="list-style-type: none"> Sensor Interfacing with TwinCAT3 	Trainer: Mr. M. Ahsan Naeem & Mr. M. Bilal
11:00 AM – 12:30 PM	1.5 Hrs	<ul style="list-style-type: none"> TwinCAT3 Motion Control Module and its implementation on BLDC Motor 	Trainer: Mr. M. Ahsan Naeem & Mr. M. Bilal
12:30 PM – 1:30 PM LUNCH BREAK			
1:30 PM – 3:00 PM	1.5 Hrs	<ul style="list-style-type: none"> Path planning and pick-and-place application on state-of-the-art 7 DOF CoBot 	Trainer: Mr. Abdullah Sheeraz & Mr. M. Bilal
3:00 PM – 3:20 PM BREAK			
3:20 PM – 4:20 PM	1 Hr	<ul style="list-style-type: none"> Closing Ceremony 	



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TENTATIVE EXPENSES FOR ANNUAL CROSS LAB TRAINING 2022

<u>Sr #</u>	<u>Item</u>	<u>Description</u>	<u>Amount Rs</u>
<u>1</u>	HCRL Trainer	4 Persons (30,000 / Person)	120,000
<u>2</u>	Refreshments 2 times x 3 days (20 Persons)	120 Meals (Rs 400 / Meal) 120 x 400	50,000
<u>3</u>	Printing (Brochures / Certificates / Flexes)	Certificates for Participants = 20 Nos Per Certificate Cost = 300 300 x 20 = 6000 Rs	20,000
		Training Standee Cost = 1000 per standee 4 Standees = 4000 Rs	
		2 x Training Flex For advertisement = 10,000 Rs	
<u>4</u>	Shields	20 Shields 600 Per Shield Total = 600 x 20 = 12,000	12,000
<u>5</u>	Stationery	One Writing Pad with Pen Set = 500 20 x 500 = 10000	10,000
<u>6</u>	Support Staff (2 Persons)	For Refreshments & Material Management Support 1000 Rs per person per day 2 Persons for 3 days = 6000	6000
Grand Total			218,000

Slots Available for Participants:

3 persons per module (5 Modules) = 15 persons

Registration Fee (Non-NCRA participants / Students) = 2000 / persons

Registration Fee (Non-NCRA participants / Professionals) = 5000 / persons

Who Should Attend:

Students, Research Associates and Professionals, etc.