

Branch Name:	Artificial Intelligence & Data Science
Program Code:	ET108
Semester/Year:	Semester VII/ Fourth Year
Subject Title:	Industrial Internet of Things
Subject Code:	1ET1080705
Pre-requisite Course:	Internet of Things, Communication and Networking, information security

Course Objective:

- IoT will change industries and transform the way we work and live. Industrial companies are already pivoting from Products to Services leveraging IoT technologies – this digital transformation is more broadly called the Industrial IoT or Industrial Internet.
- The objective of this subject is make students aware about this latest technology, its application and to identify future scope for better manufacturing system.

Teaching and Examination Scheme:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory		Practical		Total
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
03	-	02	04	70	30	30	20	150

Subject Contents

Sr. No	Topic	Total Hours	Weight (%)
1	Understanding Industrial Internet of Things (IIoT): Industrial Internet of Things and Cyber Manufacturing Systems, Application map for Industrial Cyber Physical Systems, Cyber Physical Electronics production.	8	20
2	Modeling of CPS and CMS: Modeling of Cyber Physical Engineering and manufacturing, Model based engineering of supervisory controllers for cyber physical systems, formal verification of system, components, Evaluation model for assessments of cyber physical production systems.	10	25
3	Architectural Design Patterns for CMS and IIoT: CPS-based manufacturing and Industries 4.0., Integration of Knowledge base, data base and machine vision, Interoperability in Smart Automation, Enhancing Resiliency in Production Facilities through CPS. Communication and Networking of IIoT.	8	20
4	Artificial Intelligence and Data Analytics for manufacturing: Application of CPS in Machine tools, Digital production, Cyber Physical system Intelligence, Introduction to big data and machine learning and condition Monitoring.	6	10
5	Evaluation of Workforce and Human Machine Interaction: Worker and CPS, Strategies to support user intervention. Introduction to Advance manufacturing and Innovation Ecosystems.	6	10

6	Application of IIoT: Smart Metering, e-Health Body Area Networks, City Automation, Automotive Applications, Home Automation, Smart Cards, Plant Automation, Real life examples of IIOT in Manufacturing Sector.	7	15
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Course Outcome:

Upon successful completion of this course the student would be able to:

1. Knowledge of theory and practice related to Industrial IoT Systems.
2. Ability to identify, formulate and solve engineering problems by using Industrial IoT.
3. Ability to implement real field problem by gained knowledge of Industrial applications with IoT capability.

List of References:

1. Sabina Jeschke, Christian Brecher, Houbing Song, Danda B. Rawat Editors Industrial Internet of Things Cyber Manufacturing Systems
2. Hakima Chaouchi, "The Internet of Things Connecting Objects to the Web" ISBN : 978-1- 84821-140-7, Willy Publications Olivier Hersent, David Boswarthick, Omar Elloumi,
3. The Internet of Things: Key Applications and Protocols, ISBN: 978-1-119-99435-0, 2nd Edition, Willy Publications
4. Inside the Internet of Things (IoT), Deloitte University Press
5. Internet of Things- From Research and Innovation to Market Deployment; By Ovidiu & Peter; River Publishers Series
6. Five thoughts from the Father of the Internet of Things; by Phil Wainewright - Kevin Ashton
7. How Protocol Conversion Addresses IIoT Challenges: White Paper By RedLion.
8. Dr. Guillaume Girardin, Antoine Bonnabel, Dr. Eric Mounier, 'Technologies Sensors for the Internet of Things Businesses & Market Trends 2014 -2024', Yole Development Copyrights, 2014

E-Resources:

1. <https://www.coursera.org/learn/industrial-internet-of-things>
2. <https://www.techtarget.com/iotagenda/definition/Industrial-Internet-of-Things-IIoT>

List of Experiments:

1. Study about Industrial Internet of Things and Cyber Manufacturing Systems.
2. Understand Cyber Physical Electronics production.
3. Learn Modeling of Cyber Physical Engineering and manufacturing.
4. Study about formal verification of system.
5. Learn Evaluation model for assessments of cyber physical production systems
6. Understand CPS-based manufacturing and Industries 4.0
7. Study about Communication and Networking of IIoT.
8. Learn big data and machine learning and condition Monitoring.
9. Study about Advance manufacturing and Innovation Ecosystems.
10. Learn about Real life examples of IIOT in Manufacturing Sector.

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Describe Industrial Internet of Things and Cyber Physical manufacturing	2 Understanding
CLO2	Demonstrate Cyber Physical and Cyber Manufacturing systems	2 Understanding
CLO3	Describe Architectural design patterns for industrial Internet of Things	2 Understanding 3 Applying
CLO4	Analyze AI and data Analytics for Industrial Internet of Things	4 Analyze
CLO5	Evaluation of Workforce and Human Machine Interaction and Application of Industrial Internet of Things	2 Understanding 3 Applying

Mapping of CLOs with POs & PSOs

Course Learning Outcomes	Program Outcomes(POs)												Program Specific Outcomes(PSOs)			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2	PS O 3	PS O 4
CLO1	M	L	H	L	M	M				M			H	L		
CLO2	M	L	M	M	M	M				M	L	L	M	L		
CLO3	H	M	M	L	M	H				L		L	M	H		
CLO4	H	M	M	L	M	H		M	L				M	H		
CLO5	H	M	M	H	M	H		M		L			M	H		

H:High, M:Medium, L:Low