



INTRODUCTION TO INTERNET OF THINGS

PROF. SUDIP MISRA

Department of Computer Science and Engineering
IIT Kharagpur

PRE-REQUISITES : Basic programming knowledge

INTENDED AUDIENCE : CSE, IT, ECE, EE, Instrumentation Engineering, Industrial Engineering

COURSE OUTLINE :

Internet of Things (IoT) is presently a hot technology worldwide. Government, academia, and industry are involved in different aspects of research, implementation, and business with IoT. IoT cuts across different application domain verticals ranging from civilian to defence sectors. These domains include agriculture, space, healthcare, manufacturing, construction, water, and mining, which are presently transitioning their legacy infrastructure to support IoT. Today it is possible to envision pervasive connectivity, storage, and computation, which, in turn, gives rise to building different IoT solutions. IoT-based applications such as innovative shopping system, infrastructure management in both urban and rural areas, remote health monitoring and emergency notification systems, and transportation systems, are gradually relying on IoT based systems. Therefore, it is very important to learn the fundamentals of this emerging technology.

ABOUT INSTRUCTOR :

Prof. Sudip Misra is a Professor in the Department of Computer Science and Engineering at the Indian Institute of Technology Kharagpur. Prior to this he was associated with Cornell University (USA), Yale University (USA), Nortel Networks (Canada) and the Government of Ontario (Canada). He received his Ph.D. degree in Computer Science from Carleton University, in Ottawa, Canada. He has several years of experience working in the academia, government, and the private sectors in research, teaching, consulting, project management, architecture, software design and product engineering roles. His current research interests include Wireless Ad Hoc and Sensor Networks, Internet of Things (IoT), Computer Networks, Learning Systems, and algorithm design for emerging communication networks. Dr. Misra is the author of over 260 scholarly research papers, including 140+ reputed journal papers. He has won seven research paper awards in different conferences. Recently, he and his students won Samsung Innovation Award and the IEEE ComSoc Student Competition. He was awarded the fellow of NASI. He was also awarded the IEEE ComSoc Asia Pacific Outstanding Young Researcher Award at IEEE GLOBECOM 2012, Anaheim, California, USA. He was also the recipient of several academic awards and fellowships such as the Young Scientist Award (National Academy of Sciences, India), Young Systems Scientist Award (Systems Society of India), Young Engineers Award (Institution of Engineers, India), (Canadian) Governor General's Academic Gold Medal at Carleton University, the University Outstanding Graduate Student Award in the Doctoral level at Carleton University and the National Academy of Sciences, India - Swarna Jayanti Puraskar (Golden Jubilee Award). Dr. Misra was also awarded the Canadian Government's prestigious NSERC Post-Doctoral Fellowship and the Humboldt Research Fellowship in Germany. Dr. Misra has been serving the editorial boards of distinguished journals such as the Transactions on Vehicular Technology, Transactions on Mobile Computing, International Journal of Communication Systems (Wiley) and the IET Wireless Sensor Systems (UK). In the past, he served as the Associate Editor/Editorial Board Member of the Telecommunication Systems Journal (Springer), Security and Communication Networks Journal (Wiley), and the EURASIP Journal of Wireless Communications and Networking, IET Communications Journal, and the Computers and Electrical Engineering Journal (Elsevier). Dr. Misra has published 10 books in the areas of wireless ad hoc networks, wireless sensor networks, wireless mesh networks, communication networks and distributed systems, network reliability and fault tolerance, and information and coding theory, published by reputed publishers such as Cambridge University Press, Springer, Wiley, and World Scientific.

COURSE PLAN :

Week 1: Introduction to IoT: Part I, Part II, Sensing, Actuation, Basics of Networking: Part-I

Week 2: Basics of Networking: Part-II, Part III, Part IV, Communication Protocols: Part I, Part II

Week 3: Communication Protocols: Part III, Part IV, Part V, Sensor Networks: Part I, Part II

Week 4: Sensor Networks: Part III, Part IV, Part V, Part VI, Machine-to-Machine Communications

Week 5: Interoperability in IoT, Introduction to Arduino Programming: Part I, Part II, Integration of Sensors and Actuators with Arduino: Part I, Part II

Week 6: Introduction to Python programming, Introduction to Raspberry Pi, Implementation of IoT with Raspberry Pi

Week 7: Implementation of IoT with Raspberry Pi (contd), Introduction to SDN, SDN for IoT

Week 8: SDN for IoT (contd), Data Handling and Analytics, Cloud Computing

Week 9: Cloud Computing(contd), Sensor-Cloud

Week 10: Fog Computing, Smart Cities and Smart Homes

Week 11: Connected Vehicles, Smart Grid, Industrial IoT

Week 12: Industrial IoT (contd), Case Study: Agriculture, Healthcare, Activity Monitoring



Elite

NPTEL Online Certification

(Funded by the MoE, Govt. of India)



This certificate is awarded to

AMALAQWEENANGEL

for successfully completing the course

Introduction to Internet of Things

with a consolidated score of **71** %

Online Assignments	21.47/25	Proctored Exam	50/75
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Total number of candidates certified in this course: **9793**

Jul-Oct 2022

(12 week course)

Prof. Debjani Chakraborty
Coordinator, NPTEL
IIT Kharagpur



Indian Institute of Technology Kharagpur



Roll No: NPTEL22CS96S34484283

To validate the certificate



No. of credits recommended: 3 or 4



Elite

NPTEL Online Certification

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This certificate is awarded to

BHAVADHARANI

for successfully completing the course

Introduction to Internet of Things

with a consolidated score of **67** %

Online Assignments	21.44/25	Proctored Exam	45.32/75
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Total number of candidates certified in this course: **9793**

Jul-Oct 2022

(12 week course)

Prof. Debjani Chakraborty
Coordinator, NPTEL
IIT Kharagpur



Indian Institute of Technology Kharagpur



Roll No: NPTEL22CS96S34485918

To validate the certificate



No. of credits recommended: 3 or 4



Elite

NPTEL Online Certification

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This certificate is awarded to

HARINI

for successfully completing the course

Introduction to Internet of Things

with a consolidated score of **63** %

Online Assignments	22.25/25	Proctored Exam	40.63/75
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Total number of candidates certified in this course: **9793**

Jul-Oct 2022

(12 week course)

Prof. Debjani Chakraborty

Coordinator, NPTEL
IIT Kharagpur



Indian Institute of Technology Kharagpur



Roll No: NPTEL22CS96S34486380

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No. of credits recommended: 3 or 4



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This certificate is awarded to

SANGEETHA

for successfully completing the course



Introduction to Internet of Things

with a consolidated score of **76** %

Online Assignments	21.66/25	Proctored Exam	54.69/75
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Total number of candidates certified in this course: **9793**

Jul-Oct 2022

(12 week course)

Prof. Debjani Chakraborty
Coordinator, NPTEL
IIT Kharagpur



Indian Institute of Technology Kharagpur



Roll No: NPTEL22CS96S34485162

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This certificate is awarded to

SRIVAISHNA

for successfully completing the course

Introduction to Internet of Things

with a consolidated score of **55** %

Online Assignments	21.66/25	Proctored Exam	33/75
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Total number of candidates certified in this course: **9793**

Jul-Oct 2022

(12 week course)

Prof. Debjani Chakraborty

Coordinator, NPTEL
IIT Kharagpur



Indian Institute of Technology Kharagpur



Roll No: NPTEL22CS96S44483006

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No. of credits recommended: 3 or 4