



Post Graduate Diploma in
Industrial IoT

CHOOOLS CONSULTING SERVICES PVT LTD

Delivery Mode: Virtual | Hybrid
Programme Duration: 12 Months
Credits: 62 – 65
Area of Study: Industrial Internet of Things

Prerequisites: Graduate Students and professionals. Familiarity with python / java script programming, knowledge on industrial control system (PLC / SCADA) will be an added advantage.
***Note: Students who feel they don't meet the prerequisites for the course are encouraged to get in touch with the programme coordinator before registering.*

Centre: Chools LMS

Faculty:

Role Summary:

Faculty members are expected to prepare for and meet their teaching responsibilities for every class. Each faculty member is expected to attend and participate in departmental meetings. Faculty members serve as student academic advisers and are expected to meet with each assigned student advisee. Each faculty member participates in activities relating to university programs, courses, governance, etc., or community activities which impact on, or are impacted by, the University and which contribute to the growth and development of students.

Essential Responsibilities:

- Applying the scientific method to all disciplines within their field
- Building a course curriculum
- Preparing course syllabi
- Mentoring students
- Presenting lectures
- Creating supplemental instructional materials
- Accurately evaluating students' progress
- Grading
- Staying current on the subject material
- Researching and publishing
- Presenting research
- Leading and directing research in a specific field

Qualifications/Requirements:

- At least one of the below educational qualification is mandatory to have,
- Master's in engineering (CSE /ETC /IT/ Mechanical /Production /Instrumentation)
- MCA
- MSc (Computer Science / Information technology / Electronics & Telecommunications)
- Having a PhD is preferred, and master's degree is a must Having a MBA / PGDBM will be added advantage
- Must have 60% or above in all passing exams

Desired Professional Characteristics:



- At least 8+ years of experience of working / teaching in IoT/IIoT related technologies.
- Out of the above 5+ years must be in Industry
- Must have hands on knowledge of industrial equipment control systems (PLC and SCADA) for leading OEMs (Rockwell Automation, Siemens, Schneider, Fanuc, GE etc.)
- Must have knowledge of major communication protocols like OPC UA, OPC DA, MT Connect, RS485/232 etc.
- Must have knowledge of communication protocols like Bluetooth, Zigbee, WLAN, Wi-fi
- Must have knowledge of setting up IIoT gateways for SCADA/PLC
- Excellent communication skill
- Knowledge of local language desirable
- Ability to handle a large classroom
- Ability to speak in external forums
- Ability to handle hands-on session for group of students
- Proficiency in creation / modification of course curriculum
- Knowledge of RFID /BLE /NFC desirable /Sensor connectivity
- Should possess knowledge of IIoT software platforms (Opensource or licensed)
- Must be proficient with setting up various types of sensors (like temperature, humidity & vibration measurement etc.), actuators
- Must be familiar with cloud technologies (AWS / Azure) and how to transmit data from edge to cloud
- Should be familiar with Analytical data modelling and Machine learning algorithms
- Should be proficient with finding patterns from machine /sensor data using analytical data modelling

Why Internet of Things?



Technology-based careers don't change at the same speed, but they do evolve, and the workforce must recognize that their role will not stay the same. And a working professional of the 21st century will constantly be learning, out of necessity, if not desire.

The new-age technologies offer promising career potential now and for the foreseeable future. However, most of these trending and future technologies are suffering from a shortage of skilled workers, meaning the time is right for you to choose one, get trained, and get on board at the early stages of the technology, positioning you for success now and in the future.

Chools enables professionals and enterprises to succeed in the fast-changing digital economy. The University provides outcome-based online training across digital technologies and applications such as Industrial Internet of Things, Big Data, Machine Learning, AI, Cloud Computing, Cyber Security, Digital Marketing and other emerging technologies.

The University's Blended Learning curriculum combines self-paced online learning, instructor-led live virtual classrooms, hands-on projects, student collaboration and 24/7 global teaching assistance.

If your career has been built upon technologies or practices that are fading away, it's time to get reskilled and ready for your next opportunity

Industry Buzz

The global IoT market is expected to reach a value of USD 1,386.06 billion by 2026 from USD 761.4 billion in 2020 at a CAGR of 10.53%, during the period 2021-2026. With the development of wireless networking technologies, the emergence of advanced data analytics, a reduction in the cost of connected devices, an increase in cloud platform adoption, the market is expected to grow at a positive rate.

- Industry 4.0 and IoT are at the center of new technological approaches for development, production, and management of the entire logistics chain, otherwise known as smart factory automation. Massive shifts in manufacturing due to industry 4.0 and acceptance of IoT require enterprises to adopt agile, smarter, and innovative ways to advance production with technologies that complement and augment human labor with robotics and reduce industrial accidents caused by a process failure.
- The growing adoption of IoT technology across end-user industries, such as manufacturing, automotive, and healthcare, is driving the market's growth positively.

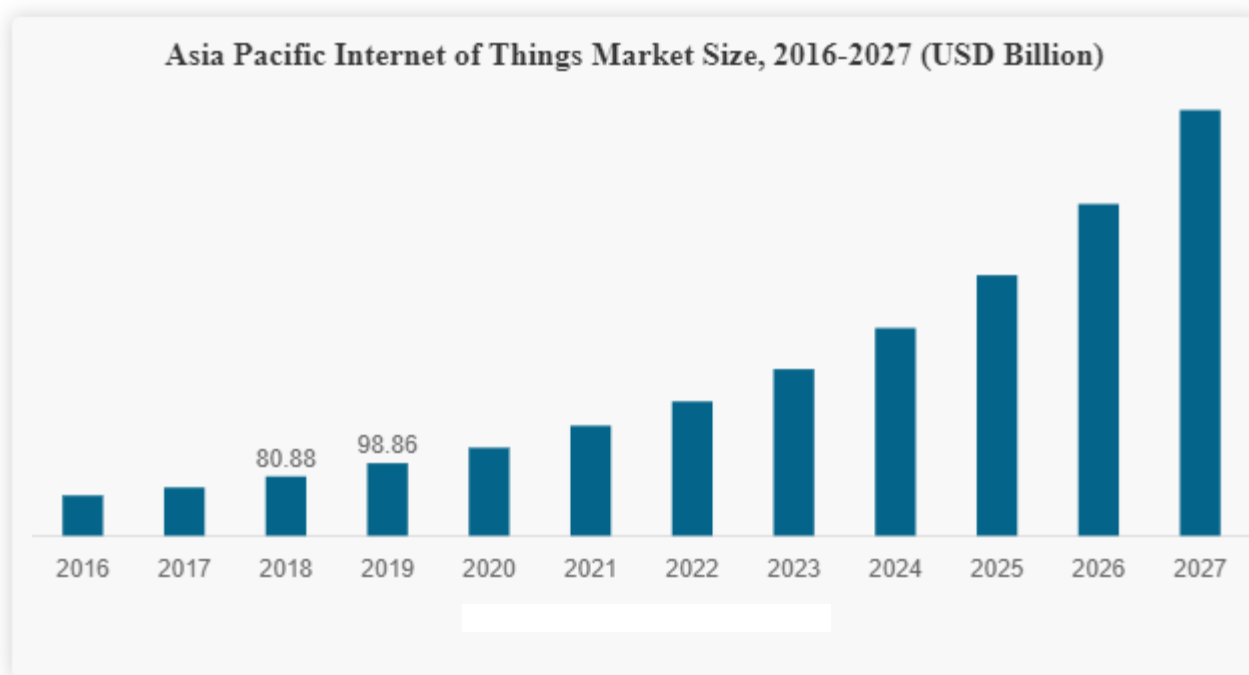
With the traditional manufacturing sector amid a digital transformation, the IoT is fueling the next industrial revolution of intelligent connectivity. This is changing the way industries approach increasingly complex processes of systems and machines to improve efficiency and reduce downtime.

- With major disruptions in global healthcare and supply chains, governments, hospitals, insurers, and logistics providers are having to react quickly for a more connected world that could help better address the current crisis and mitigate future ones.

Internet of Things Trends

Everything in today's cloud-based business world moves fast, producing and compiling data at a rapid rate. And organizations are opening their doors to data science and unlocking its power, which increases the value of a data science pros who know how to harness actionable insights out of petabytes of data.

Below are the top digital skills professionals need to get ahead in today's job market.



The IoT India Salary Study 2017 maintains that the salary of IoT professionals in India is nearly 76% higher than that of IT professionals. While IoT professionals get a median salary of Rs. 15.2 LPA, the median salary of IT professionals is around RS. 8.65 LPA.

Key Industry Verticals where IoT is prominently used,

- ❖ Manufacturing
- ❖ Transportation
- ❖ Healthcare
- ❖ Retail
- ❖ Energy and Utilities
- ❖ Residential

Course Overview



In modern world, billions of devices – starting from white label consumer products to industrial equipment, are getting connected to each other through internet commonly referred to as Internet of Things. This brings a unique opportunity to industry to be part of ongoing revolution by coming up with cutting edge solution offerings. However, this also needs skilled manpower to drive this wave. This course is designed to be a common practical meeting point for students and industry professionals, who are responsible for delivering innovative IoT solutions. This course will start an overview of Industrial Internet of Things (IIOT). The course will explain in details the purpose and the components of IIOT, the benefits and possible challenges, and provide the applications of IIOT in various industries. This course provides unique blend of theoretical knowledge and hands on exercise on industry led use cases covering RFID technology, sensors, IIoT software platforms, mobile app, data analytics, industrial control system (OT -IT) integration and many more. At the end of this course, students will find themselves confident to solve real life business problem in shop floors, managerial positions and new business development areas. The course is divided into four parts, details provided below -

Part I: Students will get trained on Introduction to IoT Fundamentals, Layers of IoT, IoT Architecture, Communication Protocol, Usage of Cloud and Analytics in IoT, Role of Security in IoT, Introduction to IoT Platform and Role of Mobile Application in IoT

Part II: Students will get trained on Advanced Mobile App Development, BLE Device-based Asset Tracking, Usage of NFC and RFID Protocols and Devices & RFID-based Asset Tracking

Part III: Students will get trained on Usage of Sensors and Actuators, Data Collection from Sensors and Transfer it to IoT Platform, Machine Connectivity and Control Systems and Data Collection from Controllers / PLC and Transfer it to IoT Platform.

Part IV: Students will get trained on Efficient Management of IoT Projects and IoT - Business implications and Opportunities

Programme Objective



The objectives of this programme are -

- To introduce students to the world of Industrial Internet of Things in today's context and to empower them with some Industrial IoT solutions which they can use to solve few real-world problems just by learning whatever is taught in the course
- To provide students with comprehensive and in-depth knowledge of IoT principles and protocols, the data transmission techniques across various layers of IoT, the state-of-the-art models and algorithms used for sensor / machine data processing
- To provide students the hands-on experience on various Industrial IoT use cases, which will help them to get selected in job opportunities related to Industrial IoT

Outline



- I. Introduction to IoT Fundamentals
 - a. Evolution of IoT
 - b. IoT - Areas of Impact
 - c. IoT Eco System

- II. Layers of IoT, IoT Architecture, Communication Protocol
 - a. Layers of IoT
 - b. Architecture of IoT
 - c. Communication in IoT

- III. Usage of Cloud and Analytics in IoT, Role of Security in IoT
 - a. Cloud Computing
 - b. Cloud based IoT Platform
 - c. Introduction to Data Analytics and Data Modeling
 - d. Role of security in IoT

- IV. Introduction to IoT Platform, Role of Mobile Application in IoT
 - a. Things Board Open Source IoT Platform
 - b. Role of Mobile Application in IoT
 - c. Android Platform

- V. Advanced Mobile App Development
 - a. Android SQLite Database
 - b. Android Bluetooth Low Energy (BLE) implementation

- VI. Hands-on - BLE Device-based Asset Tracking
 - a. Hands-on BLE device-based asset tracking
- VII. Usage of NFC and RFID Protocols and Devices
 - a. Radio Frequency Identification (RFID)
 - b. Near Field Communication (NFC)
 - c. Android RFID Implementation
- VIII. Hand-on - RFID-based Asset Tracking
 - a. Hand-on RFID based asset tracking
- IX. Usage of Sensors and Actuators
 - a. Sensors
 - b. Actuators
 - c. Arduino
 - d. Raspberry Pi
- X. Hands on - Usage of Sensors for IoT
 - a. Hands on - Usage of Sensors for IoT
- XI. Machine Connectivity and Control Systems
 - a. Introduction to Machine Connect and Control Systems
 - b. Industrial Data Flow and Devices / Systems
- XII. Hands on - Machine Connect
- XIII. Efficient Management of IoT Projects
- XIV. IoT - Business implications and Opportunities

Learning Outcomes



Expected outcome after the course completion –

- The student should be able to understand the context of Industry 4.0, IoT Architecture and would be introduced to some common IoT platforms used widely. The student should be able to understand the networking concepts and various communication protocols used in IoT
- The student will have an overview on the cloud computing concepts including cloud deployment models, cloud services model, the open stack cloud architecture, and will be able to appreciate the relevance of the Cloud in IoT
- The student will be familiar with the Things Board IoT platform (community edition) and will have a detailed hands-on knowledge on deployment and testing of the platform
- The student should be able to understand the security aspects that need to be taken care of in each of the different layers of IoT
- The student will learn the important aspects of building Android apps to identify, track and communicate with BLE devices.
- The students will have practical knowledge on:
 - Data collection from RFID fixed reader through automatic scanning by the associated antenna
 - Manual scanning, interfacing and control of the RFID hand-held reader via Android app
 - Transmission of RFID tag information to the cloud based IoT platform
- The student will be made familiar with the common types of sensors, the principles utilized in the different kinds of sensors and will be provided with functional examples
- The student will be able to implementation of IoT gateway using Arduino & Raspberry Pi
- The student will have knowledge on how key parameters related to any industrial equipment are tapped from the controller unit or PLC/SCADA associated with the equipment, and the recorded data is streamed continuously to a cloud based IoT platform via an edge gateway using suitable communication protocols.
- The student will be equipped with methodology to efficiently manage IoT projects and learn essential skillsets including trend analysis, feasibility studies (technical and functional), estimation techniques and implementation strategies
- The student will learn the mechanism and be provided with necessary skills to create an effective roadmap in order to optimize and transform the functioning of a particular organization through IoT based implementations. After completing this module and the group exercise, the student will acquire the skills to execute an IoT project while ensuring tangible improvements from the AS-IS state to the TO-BE state

Evaluation

To receive credit, you must achieve a cumulative programme grade of B- (70 percent) or better, and must achieve an average grade of at least 60% on the assignments and 60% on the final examination. Your cumulative course grade will be based on the following assessment.

Assessment	Weight%
Attending all the lectures of “Part I” i.e. <i>IoT Fundamentals, Layers of IoT, IoT Architecture, Communication Protocol, Usage of Cloud and Analytics in IoT, Role of Security in IoT</i> and completion of its assignment	20
Attending all the lectures of “Part II” i.e. <i>Advanced Mobile App Development, BLE Device-based Asset Tracking, Usage of NFC and RFID & RFID-based Asset Tracking</i> and completion of its assignment	25
Attending all the lectures of “Part III” i.e. <i>Usage of Sensors and Actuators, Machine Connectivity & Data Collection from Control Systems</i> and completion of its assignment	30
Attending all the lectures of “Part IV” i.e. <i>Efficient Management of IoT Projects, IoT - Business implications & Opportunities</i> and completion of its assignment	5
Project	20
Total	100

Course Materials

Both an e-text and other reading materials are used in this training. The required eText provides systematic and comprehensive knowledge of Industrial IoT, while the other reading materials will cover many state-of-the-art and in-depth topics that are not covered by the eText.

Software Tools

As different programming languages have been involved in the development of IoT applications, this course is not bound to any specific programming language. However, the course is designed using Python / Java Script as they have the most widely accepted industrial usage. It is highly recommended for students to use when completing their assignments and/or projects for this course. The free and/or open source development tools of these languages are available for downloading from the Internet.

The lab accessible 24*7 to the students. With the best infrastructure and state-of-the-art laboratories that are well-stocked and equipped with the latest technology, to offer the most apt environment for learning

Applicable Electives in Block chain Technology



- ❖ First elective set (6 credit)
 - Overview of Blockchain and Distributed Ledger Technology (DLT)
 - Components of Blockchain
 - Types of Blockchain and platforms
 - Study of real life Blockchain use cases
- ❖ Second elective set (4 credits)
 - Introduction to Cryptocurrencies
 - Ethereum
- ❖ Third elective set (6 credits)
 - Multichain
 - Hyperledger
 - Applications of Blockchain

*** Any two sets can be selected as electives along with the core discipline*

Applicable General Electives



- ❖ Workshops (0.5 credit per course)
 - Course 1 (8 Hrs.)
 - Basic Comp. Skills (Word/PPT/Excel)
 - Music
 - Reading Indian Texts I
 - Storytelling
 - Writing and Communication I
 - Course 2 (8 Hrs.)
 - Painting, Fine Arts
 - Theater
 - Reading Indian Texts II
 - Visual Thinking
 - Writing and Communication II
 - Course 3 (8 Hrs.)
 - Sculpting
 - Carpentry/DIY
 - Art of Summarizing
 - Digital Humanities
 - Writing and Communication III
- ❖ Understanding the Self (0.5 credit per course)
 - Course 1 (10+ Hrs.)
 - Meditation & Yoga
 - Talking to our grandparents
 - Who am I/Life Goals?
 - Course 2 (10+ Hrs.)
 - Conversation with strangers
 - Writing family histories
 - Home Science
 - Course 3 (10+ Hrs.)
 - Watching birds
 - Visiting Local Historical Sites
 - Poetry reading

**** Rules for selection had to be defined with the faculties**



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