



IoT Fundamentals

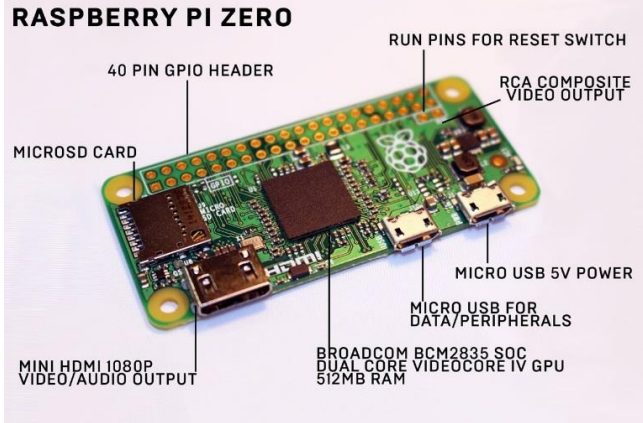
Turning the perfect storm into global opportunities

Eugene Morozov
Technical Manager CEE-RCIS, N&B
9 March 2018
Augsburg

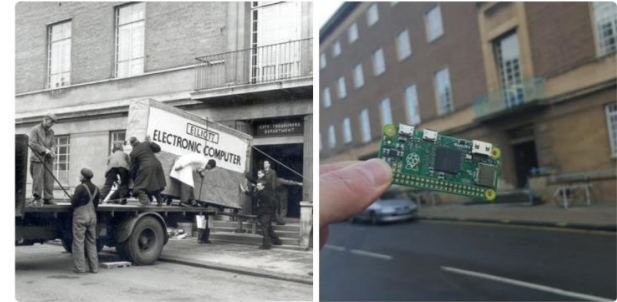
#NetAcadIPD



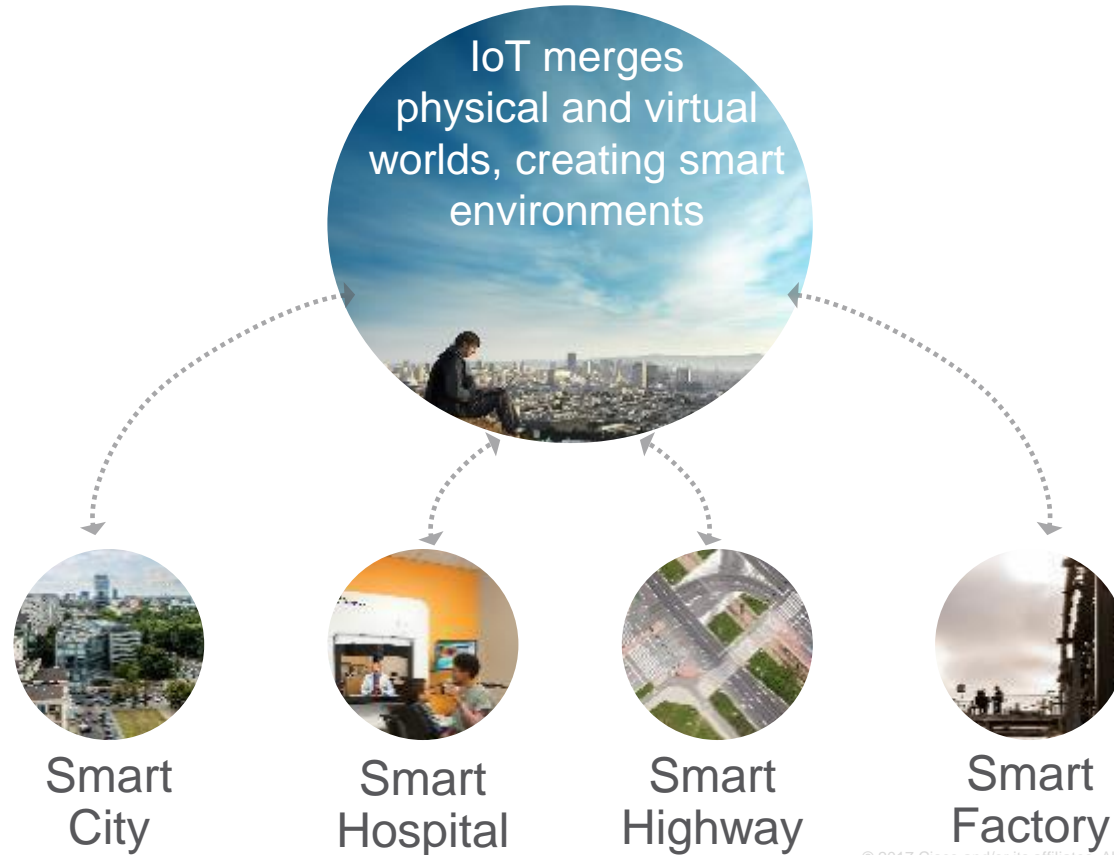
Raspberry Pi Zero – a \$5 computer



58 Years on...



Digital Transformation across Countries and Companies



New Opportunities = Employment Paths for Students

Existing Networking Academies



Information
Technology



1M Students
20K Instructors
9K Academies



New Academies and/or New Departments at Existing Academies

Process Control
Engineering



Energy
Management



Industrial
Automation

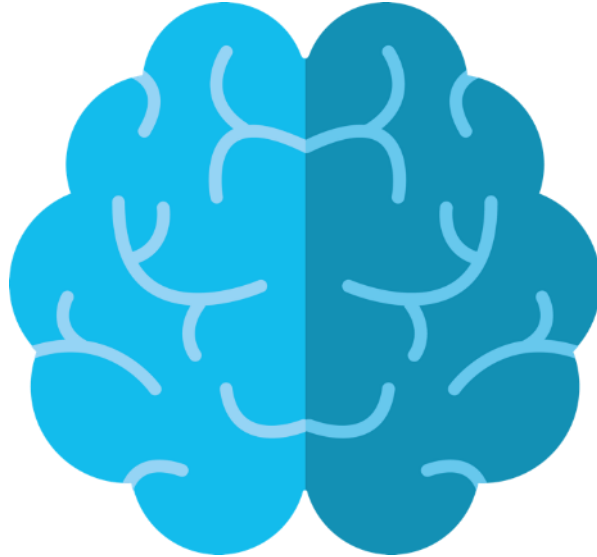


Transportation
Engineering

IoT lernen

Einführungskurs

Introduction to IoT



Fortgeschrittenen Kurse

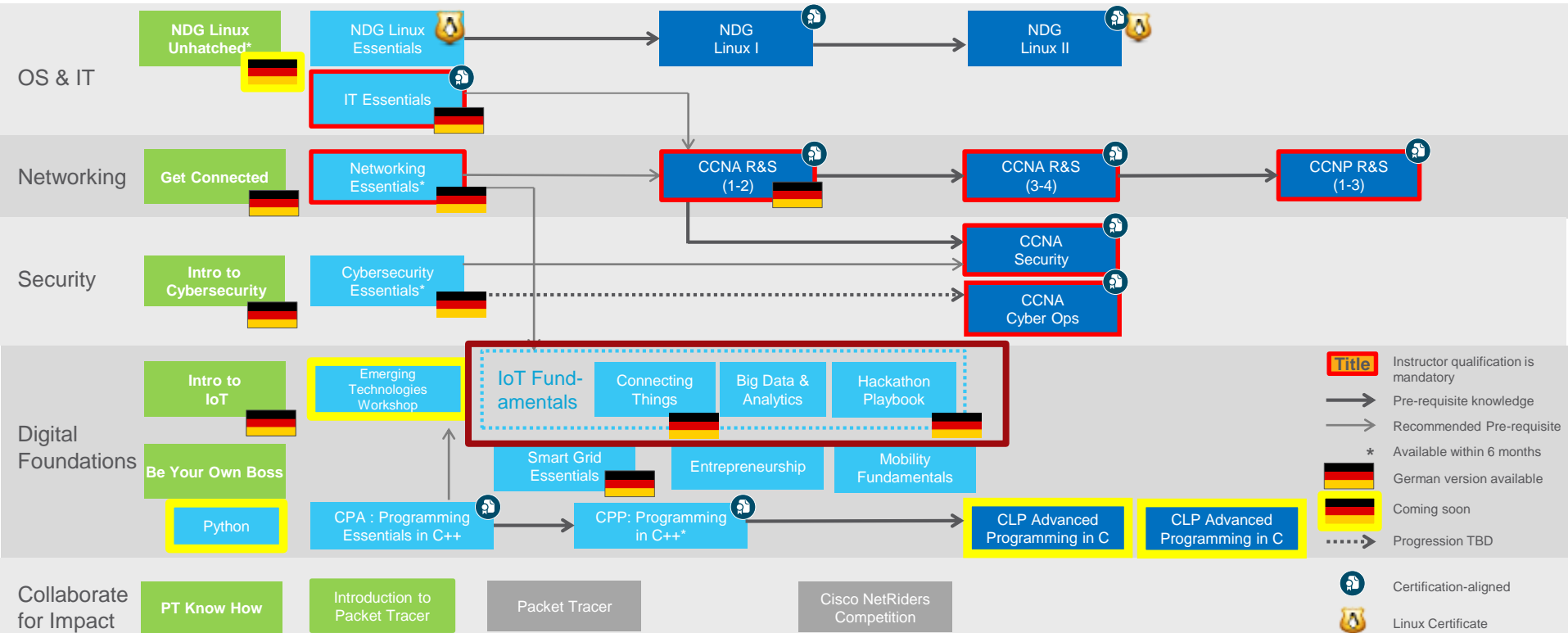
Connecting Things

Big Data & Analytics

Cisco Networking Academy Portfolio, Ende 2017/ Anfang 2018

Sample Job Titles

- Technical Support
- IT Field Service Technician
- Help Desk Technician
- Mobile Application Support
- Network Support Technician
- Network Analyst
- Network Technician
- Support Engineer
- Network Administrator
- Entry-Level Network Engineer
- Linux Administrator
- Cyber Ops Analyst
- Level II Network Engineer
- Network Designer
- Security, Voice or Wireless Engineer



IoT Fundamentals Course Summary



Course Overview

Benefits

Connecting Things

Students learn how to securely interconnect sensors, actuators, microcontrollers, single-board computers, and cloud services over IP networks to create an end-to-end IoT system.

Students will develop multi-disciplinary skillsets required to prototype an IoT solution for a specific business case with a strong focus on the security considerations for emerging technologies.

Course Delivery: Instructor-led
Estimated Time to Complete:
40-50 hours

Big Data & Analytics

Students will learn how to use Python data libraries to create a pipeline to acquire, transform and visualize data collected from IoT sensors and machines.

The transformative element of any IoT system is the data that can be collected from it. Thus the ability to extract data and using data analytics techniques to gain insights increases employability.

Course Delivery: Instructor-led
Estimated Time to Complete:
40-50 hours

Hackathon Playbook

The Hackathon Playbook is a comprehensive framework of tools and templates to prepare and run a Hackathon as a result of best practices and lessons-learned collected from the global execution of IoT Hackathons within Networking Academy and by other organizers.

Students reinforce and deepen their multidisciplinary IoT and data skills by defining, designing, prototyping and presenting an IoT solution to a panel of industry experts and peers.

Course Delivery: Instructor-led
Estimated Time to Complete:
20-30 hours

IoT Fundamentals: Connecting Things

Kursüberblick

Der Kurs fördert Kompetenzen, die erforderlich sind, um ein IoT-System, bestehend aus Sensoren, Aktoren, Mikro-Controller, Einplatinen-Computer und Cloud-Diensten, anzuwenden, unter Berücksichtigung von Sicherheitsaspekten in Betrieb zu nehmen und instand zu setzen.

Eignung

Förderung interdisziplinärer Kompetenzen, die zur Entwicklung eines IoT Prototyps notwendig sind. Die Entwicklungsszenarien orientieren sich an realen Geschäftsprozessen. Der Fokus liegt vor allem auf technologischen Innovationen und der Betrachtung der Maßnahmen zur Erhaltung der Datensicherheit.

Kompetenzentwicklung

- Konzepte, Chancen und Herausforderungen der digitalen Transformation durch Anwendung von IoT-Systemen verstehen und erklären können.
- Entwicklung eines IoT-Systems durch die Vernetzung von Sensoren/Aktoren, Mikro-Controllern, Einplatinen-Computer und Cloud-Services (Cisco Spark restful API)
- Datensicherheit im Rahmen einer IoT-Lösung erfassen.
- Die Auswirkungen der Digitalisierung in verschiedenen Branchen (z. B. Fertigung, Energiewirtschaft, Gesundheitswesen und Verkehrswesen) erfassen.
- Verwendung von Simulationswerkzeugen, um IoT-Systeme zu entwickeln.



Merkmale

Zielgruppe: Sekundarstufe II, Berufsschule, Berufsfachschule, Technikerschule, Hochschule, Universität

Voraussetzungen: Grundlagen der Programmierung, der Netzwerktechnik und der Elektrotechnik.

Verfügbare Sprachen: Englisch

Lehrmethode: Blended Learning

Geschätzter Zeitaufwand: 40-50 Stunden

Empfohlener Aufbaukurs: IoT Fundamentals: Big Data & Analytics oder Hackathon Playbook

Instruktoren-Training: erforderlich

IoT Fundamentals: Big Data & Analytics

Kursüberblick

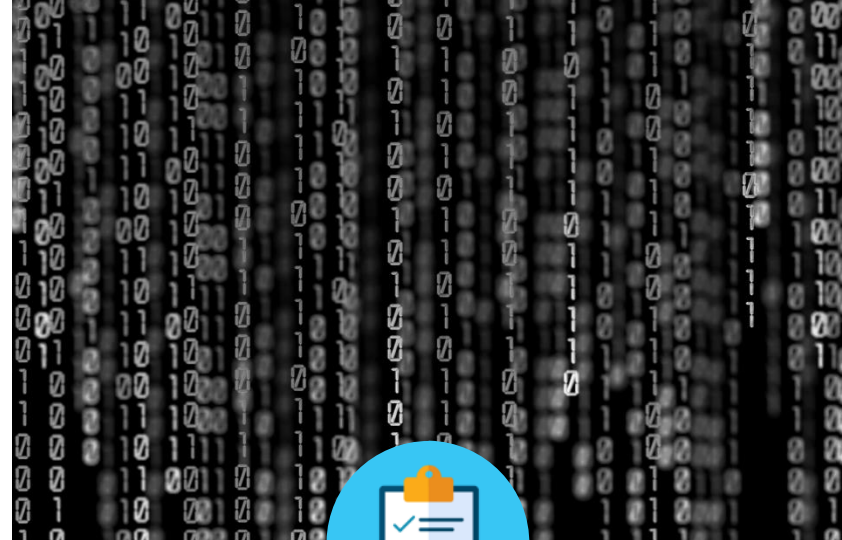
Der Kurs fördert Kompetenzen, die erforderlich sind, Instrumente zu entwickeln, die Sensor- und Maschinendaten sammeln, anpassen und visualisieren. Die Lernenden arbeiten dabei mit Python-Bibliotheken.

Eignung

Wesentliche Bestandteile eines IoT-Systems sind dessen gesammelte Daten. Die berufliche Kompetenz gewonnene Daten strukturiert und versiert zu analysieren steigert die Beschäftigungsfähigkeit.

Lehr- und Lernmaterialien

- Mit Hilfe von Python Sensordaten auslesen und in einer SQL-Datenbank sichern.
- Datensätze mit Hilfe von Bibliotheken zur Datenanalyse, bereinigen, verändern und integrieren.
- Datensätze mit Hilfe von Bibliotheken zur Visualisierung in Echtzeit darstellen.
- Grundprinzipien moderner und skalierbarer Big Data Plattform, wie Hadoop, erfassen.
- Geeignete Präsentationsmethoden, zur Darstellung der gewonnenen Erkenntnisse aus Datenerfassung, anwenden.



Merkmale

Zielgruppe: Sekundarstufe II, Berufsschule, Berufsfachschule, Technikerschule, Hochschule, Universität

Voraussetzungen: IoT Fundamentals: Connecting Things

Verfügbare Sprachen: Englisch

Lehrmethode: Blended Learning

Geschätzter Zeitaufwand: 40-50 Stunden

Empfohlener Aufbaukurs: IoT Fundamentals: Hackathon Playbook

Instruktoren-Training: erforderlich

IoT Fundamentals: Hackathon Regieanweisung

Überblick

Die Regieanweisung unterstützt bei der Vorbereitung und Durchführung eines Hackathons.

Eignung

Lernende sind gefordert ihre IoT-Kompetenzen in einem interdisziplinären Team unter Beweis zu stellen. Sie müssen eine IoT-Lösung definieren, skizzieren, einen Prototyp erstellen und die entwickelte Lösung vor einem Gremium verteidigen, das sich aus Fachleuten der einschlägigen Branche und Kollegen zusammensetzt.

Phasen

- **Impuls:** eine Problemstellung verstehen, eingrenzen und darstellen. Anschließend erfolgt die passende Teambildung.
- **Konzeption:** ein Konzept ausdenken das noch nicht existiert. Das Konzept soll einen Lösungsansatz zu einem gesellschaftlichen Problem bieten.
- **Experten betreuen die Lernenden** bei ihrer Konzeptpräsentation und bereiten Sie auf die finale Präsentation vor.
- **Entwicklung des Prototyps:** Festlegung eines Handlungsplans zur Erstellung des Prototyps. Der Plan beinhaltet eine strukturierte Darstellung. Daraus ist für Fachleute das Konzept und ggf. auch Unterstützungsbedarf ersichtlich.
- **Testphase:** Begleitet durch einen weiteren Experten werden das Konzept und der Prototyp überprüft. Dabei wird die Gebrauchstauglichkeit festgestellt und Verbesserungsvorschläge werden berücksichtigt.
- **Präsentation:** Finale Darstellung des Prototyps in Gegenwart einer Jury.



Merkmale

Zielgruppe: Sekundarstufe, Berufliche Bildung, Studenten

Voraussetzungen: IoT Fundamentals: Connecting Things und/oder Big Data and Analytics

Verfügbare Sprachen: Englisch

Lehrmethode: Blended Learning

Geschätzter Zeitaufwand: 20-30 Stunden

Empfohlener Aufbaukurs: sämtliche Bildungsangebote in der IT-Weiterqualifizierung

Instruktoren Training: erforderlich

Cisco Prototyping Lab

Tool Overview

The Cisco Prototyping Lab is a comprehensive learning environment created by Cisco for Networking Academy students to learn and practice key aspects of the foundational IoT technologies. Using an engaging, hands-on approach, it supports both the learning and creative phases of the Networking Fundamentals curriculum.

Career Prep

Provides an easy to use, comprehensive learning environment using real devices, code, coding tools and data that students use to create the physical interconnection of an end-to-end IoT and the logical data pipeline to acquire, analyze and present data.

Learning Components

- Prototyping Lab App
- Prototyping Lab Kit
 - Raspberry Pi 3 CanaKit Ultimate Starter Kit (or equivalent)
 - SparkFun Inventor's Kit for Arduino v3.2 (or equivalent)
 - Cables, sensors & actuators

Features

As an integral part of the Networking Academy learning experience, Cisco Prototyping Lab provides

- Interactive labs using Jupyter Notebook
- Visual programming with Blockly
- Device programming with Python
- Data visualization & analytics
- Connected applications via APIs
- Rapid Prototyping



Packet Tracer

Tool Overview

Packet Tracer is an innovative simulation and visualization tool used for lectures, labs, games, homework, assessments, and competitions. It is embedded in these courses:

- CCNA Routing and Switching
- CCNA Security
- IT Essentials
- Intro to the Internet of Things
- Mobility Fundamentals

Career Prep

The Packet Tracer simulation-based learning environment promotes the development of essential career skills ranging from teamwork and critical thinking to creative problem solving.

Learning Components

- Cisco Packet Tracer (PT)
- PT Mobile Android
- PT Mobile iOS
- PT Games

Features

As an integral part of the Networking Academy learning experience, Packet Tracer provides

- Simulation
- Visualization
- Authoring
- Assessment
- Collaboration capabilities and facilitates the teaching and learning of complex technology concepts.

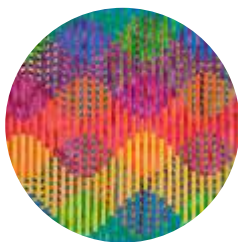


IoT Fundamentals Approach

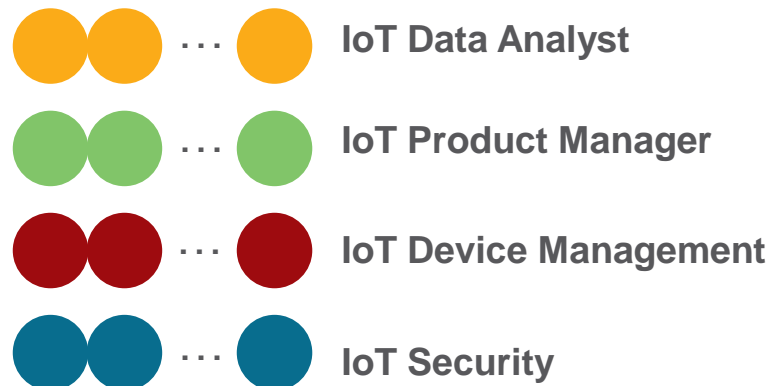
A Multidisciplinary Digital Foundation

...For Many IoT Career-Ready Pathways

IoT Fundamentals



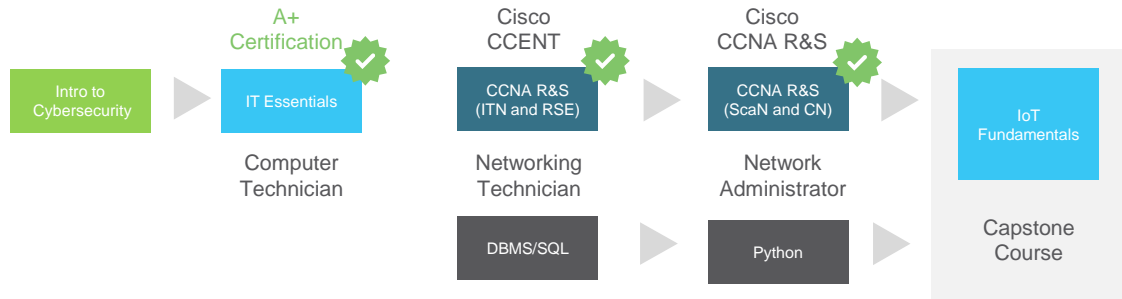
Electronics
Programming
Networking
Data Analytics
Cybersecurity
Problem solving
Design thinking
Soft skills



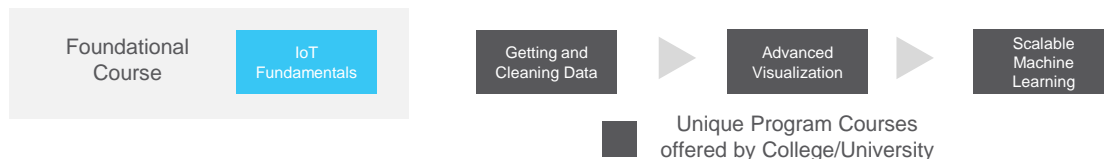
and many others

IoT Fundamentals Examples of Career-Ready Pathways

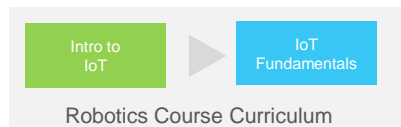
Ex. Infrastructure Program at a 2-Yr / Vocational College



Ex. Data Science program at 4-Yr College/University



Ex. Robotics program at Secondary School



Unique Skills for entry into post-secondary degree or training programs, for ex.
 Engineering IoT Infrastructure Data Science Cybersecurity

Certification



IoT Fundamentals Academy support resources include shared implementation scenarios across our community

Recommended Entry Knowledge

Recommended pre-requisite knowledge for IoT Fundamentals:

- Familiarity Basic TCP/IP Networking including cabling and interconnecting devices in Ethernet LAN and to Internet.
- Familiarity with Cisco Packet Tracer, a network and IoT devices simulation application
- Foundational knowledge of Python or any other imperative programming language to solve basic algorithmic problems
- Foundational knowledge of physics including current, voltage, resistance, and power.

Note:

Although not mandatory, student learning will be amplified if the students have completed one or more of the following Networking Academy Courses:
One course from our Networking Product Line:

- Networking Essentials | CCNA 1 Introduction to Networks | IT Essentials
- Python course (coming soon!)
- Cybersecurity Essentials
- PT Know How
- Introduction to IoT



IoT Fundamentals contains optional refresher material for the above skills when needed at the start of each chapter

IoT Fundamentals

Instructor Training Requirements

Recommended Qualifying Skills

- Basic TCP/IP networking including cabling and connecting devices in a LAN and to the Internet.
- Familiarity with Cisco Packet Tracer, a network and IoT devices simulation application.
- Experience using any programming language to solve basic algorithmic problems.
- Foundational knowledge of physics including current, voltage, resistance, and power.

Recommended Experience

- Teaching Quantitative problem solving skills
- Business context (Professional non-academic work experience or guest speakers)

Instructor Training & Support:

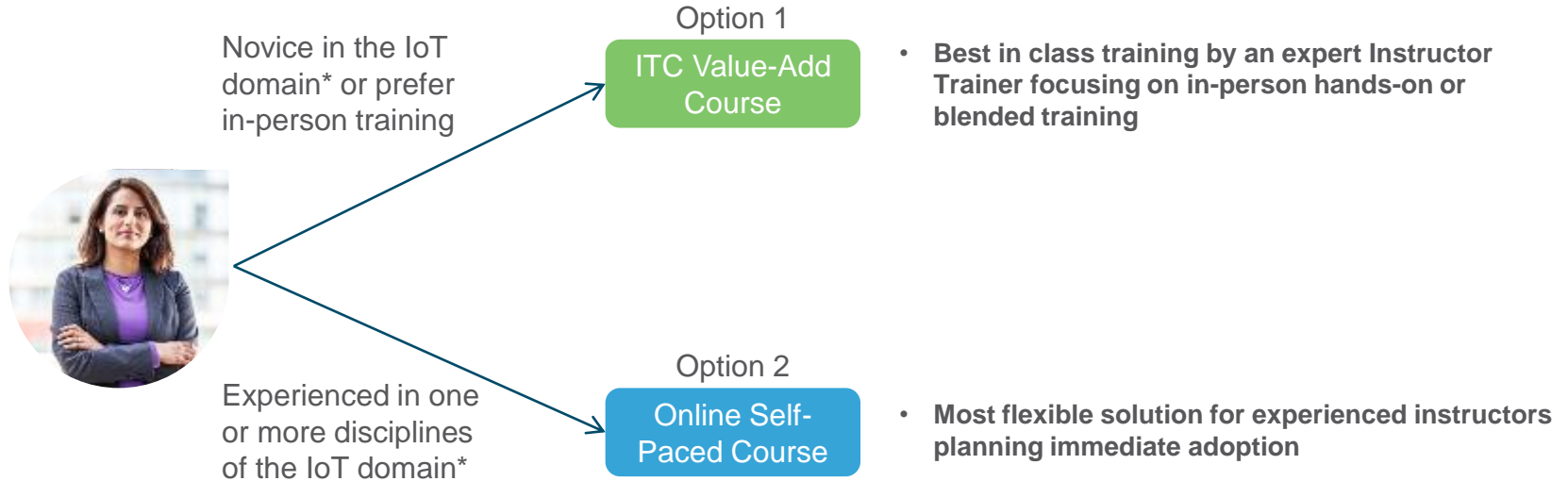
1. Academies must align with an ASC.
2. Instructor Training is required.
3. Instructors can enroll in a self-paced basic training course on their own or register for training with an ITC.

NOTE:

IoT Fundamentals Limited Availability instructors are accredited to teach v2.0 with no additional instructor training. Limited Availability Instructor Trainer participants are also qualified to create ITC courses for v2.0.



IoT Fundamentals Instructor Training Options

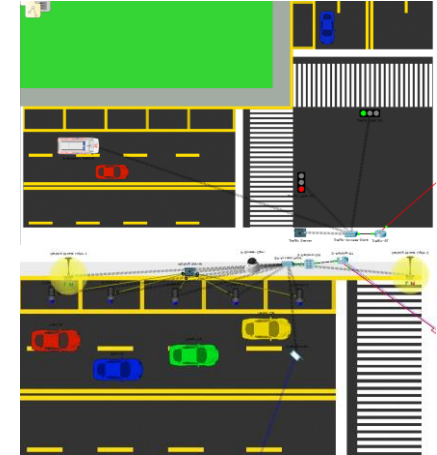
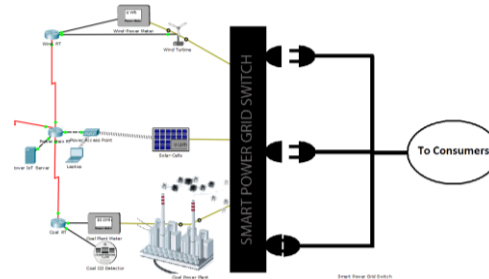
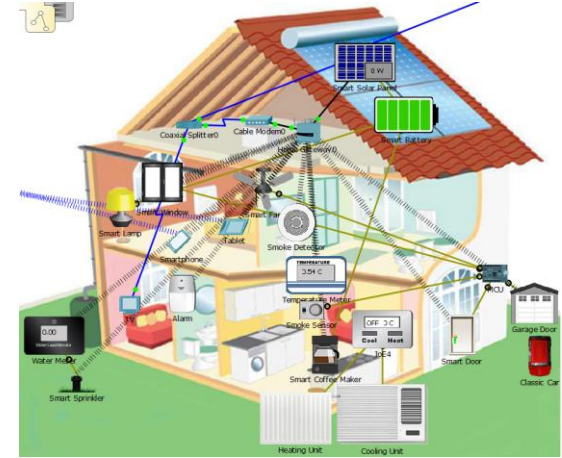
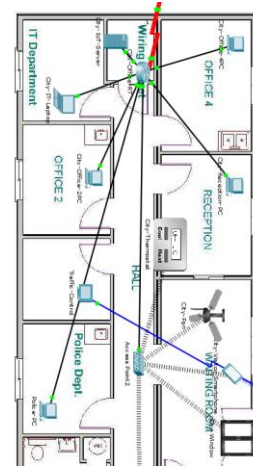


* Ex. Maker, Teacher of embedded computing or electronics

IoT Fundamentals: Connecting Things Demo

Version 7.1 Highlights

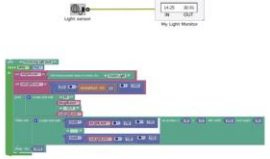
- Bluetooth
- Patch panels and wall sockets
- Physical Environments
- Smart devices, sensors and actuators for Home, City, Industry, Power
- Edit existing or program your own devices
- Python, Javascript, Blockly
- Home Gateway and IoT Server
- Rules for devices to work together
- Real world communication
- Real API communication



PT7 in Global IPD Week

PT 7.0 and the Real World March GIPD Week

Programming Smart Devices in PT 7.0 Part I September GIPD Week



Global IPD Week

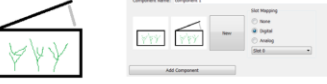
Join us for sessions on 6 - 10 March, 2017.
Click below to register for live sessions, review recordings and download resources.
Click the Archive button below to see the sessions from September and December 2016.

CCNA R&S 6.0 & Bridging Course Resources

Archive

Facebook

Programming Smart Devices in PT 7.0 Part II December GIPD Week



My Smart Greenhouse

```
function loop() {  
  var temp = Environment.get("Ambient Temperature");  
  Serial.println("Current temperature: " + temp);  
}
```

Global IPD Week

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CCNA R&S 6.0 & Bridging Course Resources

Archive

Facebook

Use online data

- 1 Take an existing device
- 2 Read weather data from an online server
- 3 Parse the data and display

Use room environment

- 1 A real temperature measuring device
- 2 Web-server to report the data
- 3 Simulated device to read the data

Output to the real world

- 1 Use existing simulated motion detector
- 2 Send current state to web server
- 3 Device to turn on a signal light

Global IPD Week

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Day 1
Tues 7th March, 2017

Day 2
Wed 8th March, 2016

Day 3
Thurs 9th March, 2017

Localized Languages

Program Updates
[Check the Agenda]

Technical Sessions
[Check the Agenda]

Instructor Forums
[Check the Agenda]

العربية
Français
Português
Español
Русский
Türkçe
中文
Deutsch
Italiano

[CCNA R&S 6.0 & Bridging Course Resources](#)

Mar. & Dec. 2016 Global IPD Week
Archives

Archive

Earn a Certificate of
Attendance

Learn about the Sweepstakes

SWEESTAKES

Recordings Available
<http://cs.co/GIPD18>

Instructor Professional Development

Global IPD Week 5-9 March

- **Program Updates** 
 - Catch up on the latest strategies and products from Cisco Networking Academy!
- **Technical Session Topics**
 - CCNA Cybersecurity Operations
 - Programming Essentials in Python
 - Network Programmability in NetAcad
 - Netflow Operations
 - Understanding an attack using Security Onion
 - Der neue CCNA Cyber Operations-Kurs 

Join us for sessions on 26 Feb - 2 March 2018.

Click below to register for live sessions, review recordings and download resources. Click the **Archive** button below to see the sessions from previous GIPD Weeks.

English Sessions

Program Updates
27 Feb
[Check the Agenda]

Localized Languages

 العربية	 中文	 Русский
 Español	 Français	 Italiano
 Türkçe	 Português	 Sinhalese
 Hindi	 Telugu	 Bengali
 Bangla	 Bahasa	 Vietnamese
 Hebrew	 Polska	 Deutsch

**Global IPD Week Course
Enrollment Link -
<http://cs.co/GIPD18>**

FY18 Global IPD Weeks <http://cs.co/GIPD18>



11 to 15
September
2017

27 November to
1 December
2017

26 February to
2 March
2018

7 to 11
May
2018



The Networking Academy Learning Portfolio

Current & Planned



Aligns to Certification



Instructor Training required



Self-paced

* Available within 12 months

Collaborate for Impact



Introduction to Packet Tracer

Packet Tracer

Hackathons

Prototyping Lab

NetRiders

Internships

Exploratory

Foundational

Career-Ready



Networking



Networking Essentials



Mobility Fundamentals



CCNA R&S: Introduction to Networks, R&S Essentials, Scaling Networks, Connecting Networks



CCNP R&S: Switch, Route, TShoot
Emerging Tech Workshop: Network Programmability*



Security



Introduction to Cybersecurity



Cybersecurity Essentials
IoT Security*



CCNA Security



CCNA Cyber Ops*



IoT



Introduction to IoT



IoT Fundamentals:

Connecting Things, Big Data & Analytics
Hackathon Playbook



OS & IT



NDG Linux Unhatched



NDG Linux Essentials
IT Essentials



NDG Linux I



NDG Linux II



Programming



CLA: Programming Essentials in C



CPA: Programming Essentials in C++

PCA: Programming Essentials in Python*

Emerging Tech Workshop: Collaboration / Spark API*



CLP: Advanced Programming in C*



CPP: Advanced Programming in C++*



Business



Be Your Own Boss



Entrepreneurship



Digital Literacy



Get Connected