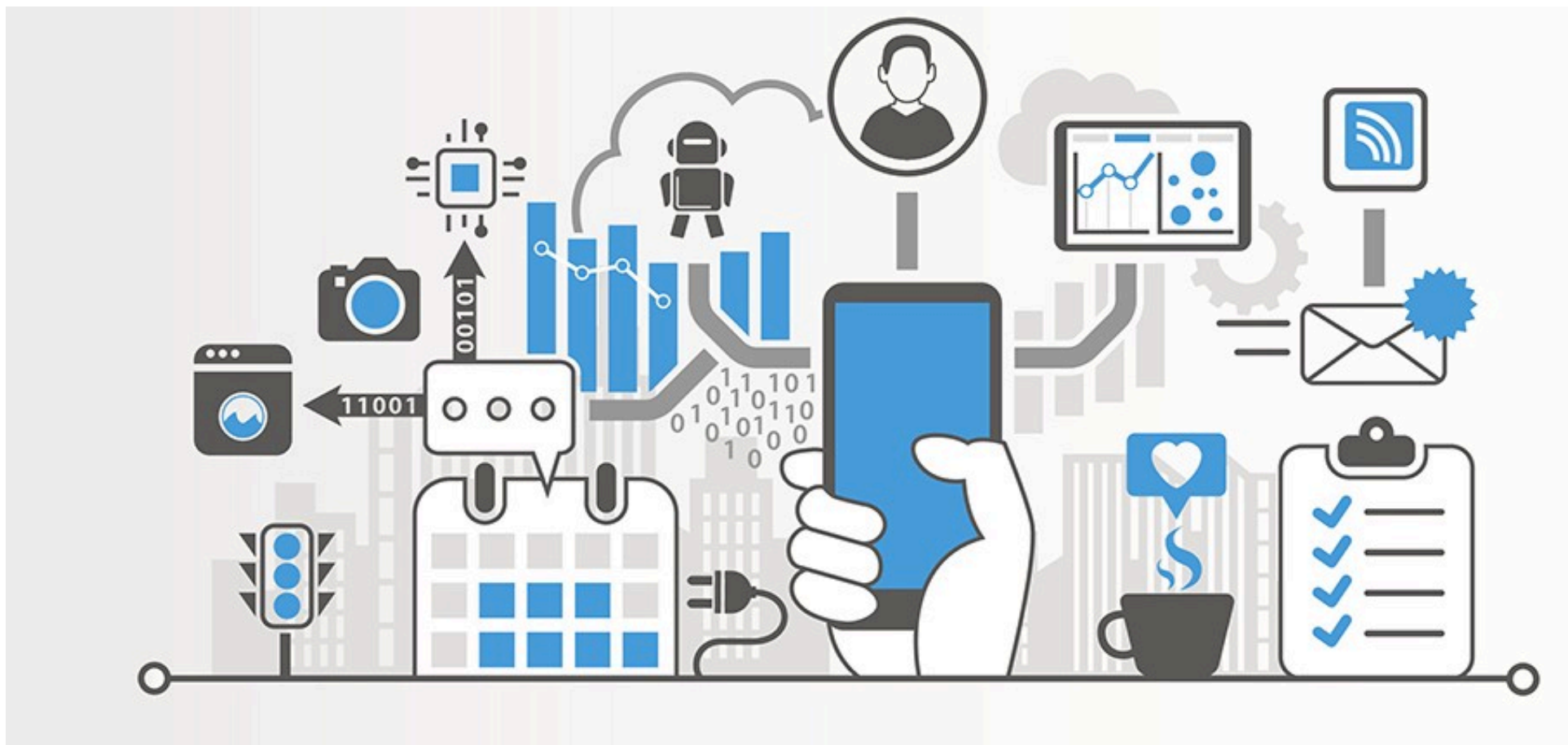




Programming for IoT Applications

Edoardo Patti

Lecture 0





Course introduction

- Organization
 - 40 h classes
 - 20 h labs (about 6 or 7 labs)
- Exam
 - Written text: 12/30
 - Project discussion (videos + presentation + code): 18/30
 - Project discussion date is flexible (no time constraints, even in another session, but **all HW material must be returned by next September**, unless you use yours)
 - Project material must be submitted at least 5 days before discussion
 - More info about project requirements will be given during the course



Projects

- Projects will be proposed by students
- Projects will be based on RaspberryPI + sensors
- Project team
 - members: 4
 - team building: autonomous
 - 1 raspberry kit for each team
- Lab dates (tentative):
 - 24/10, 31/10, 07/11, 21/11, 12/12, 09/01, 16/01



Course purpose

- How to design distributed software platform for dealing with IoT devices
- How to communicate with IoT devices
- How to get data from sensors and give commands to actuators
- How to write distributed applications to manage data from devices



Course purpose

- Programming IoT devices includes:
 - Sensors/actuator interfacing
 - Object and Web oriented programming (ok, this is like PCs)... but protocols and APIs are different
 - Lightweight, QoS oriented, low-power
 - Using specific communication paradigm and protocols (e.g. publish/subscribe)
 - Using middleware services
 - Data analytics and ML from IoT programming
- So, which instruments you need to learn?



Course contents

- Introduction to the Internet of Things
- Introduction to object oriented programming in Python
- Introduction to common data formats for information exchange (i.e. XML, JSON)
- IoT devices and communication protocols
 - Programming distributed objects using Web Services
 - RestFULL Web Services (GET, PUT, POST, DELETE methods)
 - Publish/subscribe communication paradigms
 - MQTT
- Microservices and Middleware programming
 - Microservice design pattern
 - Middleware
 - Dockers
- IoT Platforms and middleware
 - Software requirements
 - Design and development of distributed IoT platforms
 - Linksmart
 - Thingspeak, Amazon, IBM Bluemix
- Design and development of services for different context domains



Course contents

- Labs
 1. Python programming
 - Basics, OOP
 2. Web programming I
 - Web services, cherrypy, static pages
 3. Web programming II
 - Web services, cherrypy, dynamic pages, REST+JSON
 4. Raspberry PI
 - Sensors + MQTT
 5. Management of IoT devices and services
 6. Assignments

BASIC KIT



[Raspberry pi2
+ case](#)



[T, H sensor](#)



[Relay](#)



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