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# Cursos y Training

[cursos](#), [coursera](#), [mooc](#), [training](#)

## Gaia-X Governance Framework

Gaia-X Association covers three pillars: Compliance: for a common digital governance based on European values. Federation: enables interoperable & portable (Cross-) Sector data-sets and services. Data exchange: A mean to perform data exchange and anchor data contract negotiation results into the infrastructure. Each pillar will have one or more artefacts in the form of Specifications, Software and Label.

For further details please browse here. <https://docs.gaia-x.eu/framework/>  
<https://docs.gaia-x.eu/framework/?tab=software>

Gaia-X Lab Compliance Service.

[https://gitlab.com/gaia-x/lab/compliance/gx-compliance/-/tree/v1.0.0?ref\\_type=tags](https://gitlab.com/gaia-x/lab/compliance/gx-compliance/-/tree/v1.0.0?ref_type=tags)

Gaia-X Lab Registry. [https://gitlab.com/gaia-x/lab/compliance/gx-registry/-/tree/v1.0.0?ref\\_type=tags](https://gitlab.com/gaia-x/lab/compliance/gx-registry/-/tree/v1.0.0?ref_type=tags)

GXDCH (Gaia-X Digital Clearing House) - the one-stop place to go and get verified against the Gaia-X rules to obtain compliance in an automated way. The GXDCH is the necessary element to operationalize Gaia-X in the market. The Gaia-X Framework describes functional specifications, technical requirements, and SW assets necessary to be Gaia-X compliant. The GXDCH are a network of execution nodes for the compliance components that we have developed. This safeguards the distributed, decentralised ways of running the Gaia-X compliance, not operated centrally by the Association, and where anybody can benefit from the open, transparent, and secure federated digital ecosystem - thus making the Gaia-X mission a reality. <https://gaia-x.eu/gxdch/>  
<https://docs.gaia-x.eu/framework/?tab=clearing-house>

The Gaia-X Digital Clearing House (GXDGH) is the mechanism through which Gaia-X is operationalised in the market. The Gaia-X Framework contains functional specifications, technical requirements, and the software to use to become Gaia-X compliant and/or Gaia-X compatible. The GXDCH contains a subset of the software components in the Gaia-X Framework: the mandatory components and some of the optional ones.

<https://docs.gaia-x.eu/framework/?tab=software> <https://gitlab.com/gaia-x/lab/gxdch>

<https://gitlab.com/gaia-x/lab>

<https://gitlab.com/gaia-x/lab/compliance>

Gaia-X - 1 - Compliance Service. Compliance service enforcing rules defined in the TrustFramework - Architecture Document/Compliance Document. Gaia-X - 2 - Registry. Source of truth for the Compliance engine, validating certificate are conforming to rules, providing shapes, schemas and trusted sources. Gaia-X - 3 - Notary - registrationNumber. Notarization API to get a Legal Registration Number used to get compliance Gaia-X - 4 - IPFS Pinning Service. This project helps pushing and pinning on IPFS the registry static files, shapes, context, ontology, revoked issuers and trusted clearing houses. Gaia-X - 5 - Trust Anchor Service. Service building, signing and pushing on IPFS the Gaia-X AISBL trusted anchors list

<https://gitlab.com/gaia-x/lab/libraries>

## Libraries to generate and validate DID, sign Gaia-X credentials using JWS 2020, and a ETSI 119 612 serializer for Gaia-X's trusted anchors

Gaia-X did-verifier. A JavaScript library to verify DIDs and their verification methods against a registry  
Gaia-X did-web-generator. Javascript library allowing to generate a DID.json file through public key and domain name  
Gaia-X json-web-signature-2020. A lightweight JsonWebSignature2020 signing and verification Typescript library by Gaia-X AISBL  
Gaia-X jsonld-http-client. Simple HTTP client replacement for @digitalbazaar/http-client using axios and without relying on ky nor wasm  
Gaia-x Trusted List Serializer.

## Eclipse GAIA-X and DataSpaces

<https://gitlab.eclipse.org/eclipse/xfsc/>

## Post-Quantum Cryptography (PQC) - Security

Due to recent development in quantum computing, the invention of a large quantum computer is no longer a distant future. Quantum computing severely threatens modern cryptography, as the hard mathematical problems beneath classic public-key cryptosystems can be solved easily by a sufficiently large quantum computer. As such, researchers have proposed PQC based on problems that even quantum computers cannot efficiently solve. Generally, post-quantum encryption and signatures can be hard to compute. This could potentially be a problem for IoT, which usually consist lightweight devices with limited computational power. There are existing literature on the performance for PQC in resource-constrained devices to understand the severeness of this problem. It exists recent proposals to optimize PQC algorithms for resource-constrained devices.

Online videos and courses about PQC.

<https://www.classcentral.com/subject/post-quantum-cryptography?lang=english>

Post-Quantum Cryptography for Internet of Things: A Survey on Performance and Optimization.

<https://arxiv.org/abs/2401.17538>

PQ-TLS-Test is a project dedicated to testing post-quantum TLS (PQ-TLS) in PQ-hybrid schemes on both general-purpose computer systems and embedded systems. The project aims to provide comprehensive insights into the performance of post-quantum cryptography (PQC) by evaluating various handshake modes, client scales, and network topologies.

<https://github.com/PQTLS/MLT>

<https://github.com/open-quantum-safe>

<https://github.com/PQCA>

<https://github.com/topics/post-quantum-cryptography>

WolfSSL integration into libcoap for experimenting with Post-Quantum Cryptography..

<https://github.com/qursa-uc3m/libcoap-wolfssl>

## Claude - ChatGPT for programming

Claude se basa en sonet3.5 y en claude.ai, hay una interfaz similar a chatgpt, pero para que sea ya mucho más útil hay que ir directamente a la empresa anthropic y solicitar una api key y saltarse la interfaz web grafica

En <https://console.anthropic.com/> ya se puede uno registrar y crear keys y con la apikey y metiendole saldo ya tenemos para configurar la extensión de vscode y hacer preguntas desde allí la extensión sale en los vídeos que es claude-dev pero ahora ha cambiado el nombre a cline

Lo que hay que buscar en youtube es "claude.ai en vscode"

[https://www.youtube.com/watch?v=E\\_yTAau--sE](https://www.youtube.com/watch?v=E_yTAau--sE) <https://www.youtube.com/watch?v=CoHSHOyITlc>

<https://www.youtube.com/watch?v=ic9905SMPzk>

claude va perfecto a día de hoy pero lo mismo en 1 mes sale otro mejor

## EU research project management

Aquí tienes un curso gratuito de 1 hora que explica aspectos claves a entender sobre la participación, gestión y justificación de los proyectos I+D EU.

A continuación, podéis encontrar el enlace al curso y también están los vídeos subidos a Youtube. Recomiendo sobre todo, el capítulo 2 y el capítulo 4.

Free Tutorial - Horizon Europe: from proposal stage to project management | Udemy

<https://www.udemy.com/course/horizon-europe-project-management/>

- Introduction to the MOOC, given by Laura Gómez (ICCRAM-UBU).
- Chapter 1: Horizon Europe Framework, by Raquel Moreno (AXIA Innovation).
- Chapter 2: Project management models, by Laura Gómez (ICCRAM-UBU).  
<https://youtu.be/aYSPUf0Yoak?feature=shared>
- *Chapter 3: Successful proposal writing*, by Sonia Martel (ICCRAM-UBU).  
<https://www.youtube.com/watch?v=LBhAR5VM-us>
- Chapter 4: EU Project Management, by Laura Gómez (ICCRAM-UBU).  
<https://youtu.be/LA7Zf74jKqE?feature=shared>
- Chapter 5: Exploitation and IPR management, by Raquel Moreno (AXIA Innovation)
- Chapter 6: Communication and dissemination management, by Beatriz Lapuente (ICCRAM-UBU)

Además, se comparte una guía que explica la participación en proyectos I+D EU, no hace falta leerlo completamente aunque sobre todo tiene un glosario al final donde podéis ver los principales términos y conceptos claves que se usan en los proyectos I+D EU. Y consultarlo cada vez que escuches o leas un término que no conocéis. PM<sup>2</sup>, Project management methodology - Publications Office of the EU (europa.eu)

<https://op.europa.eu/en/publication-detail/-/publication/ac3e118a-cb6e-11e8-9424-01aa75ed71a1>

A nivel más experto, hay un manual online que explica en detalle cómo usar el portal EU para

solicitar, gestionar, justificar los proyectos y explica las principales acciones que se realizan durante todo el tiempo de vida de un proyecto EU.

[https://ec.europa.eu/research/participants/docs/h2020-funding-guide/index\\_en.htm](https://ec.europa.eu/research/participants/docs/h2020-funding-guide/index_en.htm)



## C Programming

- King, "C Programming A Modern Approach"
  - Especialmente interesantes los capítulos 10 y 15 sobre compilación de programas por módulos (varios archivos .c).
- Hook, "Write portable code: an introduction to developing software for multiple platforms.", 2005, [Online]. Available: [http://books.google.com/books?hl=en&lr=&id=4VOKcEAPPO0C&oi=fnd&pg=PR15&dq=Write+Portable+Code:+A+Introduction+to+Developing+Software+for+Multiple+Platforms&ots=WE\\_oO8Cv2X&sig=TWzivvIW8jA98rvXXPzPbnLI-28](http://books.google.com/books?hl=en&lr=&id=4VOKcEAPPO0C&oi=fnd&pg=PR15&dq=Write+Portable+Code:+A+Introduction+to+Developing+Software+for+Multiple+Platforms&ots=WE_oO8Cv2X&sig=TWzivvIW8jA98rvXXPzPbnLI-28).

## Networking

- Use of [Scapy](#) for interactive network packet manipulation.

## MOOCs

### Coursera, EdX y Udemy

- Si te da muchos problemas la plataforma web de COURSERA para los cursos gratuitos, puedes buscar cursos similares en la web EdX, Udemy.

Massive Open Online Course (MOOC) is an online course aimed at unlimited participation and open access via the Web. In addition to traditional course materials, such as filmed lectures, readings, and problem sets, many MOOCs provide interactive courses with user forums or social media discussions to support community interactions among students, professors, and teaching assistants (TAs), as well as immediate feedback to quick quizzes and assignments.

Among the most popular platforms are Coursera and EDX.

## Git MOOCs

IMPORTANT course with some guides about git submodules. GIT: Free Git Tutorial - Git: Become an Expert in Git & GitHub in 4 Hours. Udemy <https://www.udemy.com/course/git-expert-4-hours/> Good practices with Git repository. [https://wiki.odins.es/research/good\\_practices/home](https://wiki.odins.es/research/good_practices/home)

- **NOTE** both the command line and a graphical interface tool are covered. It is **strongly** advised to learn how to use the **command line** and skip the graphical interface tool sections.

Alternativas en Español - <https://www.coursera.org/learn/git-espanol> - <https://www.udemy.com/course/git-desde-cero/>

## IoT MOOCs

**IoT Specializations** this is a group of courses. - <https://www.coursera.org/specializations/iot>

IoT specialization courses:

1. [Introduction to the Internet of Things and Embedded Systems](#)
2. [The Arduino Platform and C Programming](#)
3. [Interfacing with the Arduino](#)
4. [The Raspberry Pi Platform and Python Programming for the Raspberry Pi](#)
5. [Interfacing with the Raspberry Pi](#)

## Instalation of ESP32 programming environment

Follow the steps indicated in this wiki [page](#) to start programming the ESP32 device and solve the principal errors obtained during the configuration.

## Other reference material

- Simplilearn. Machine Learning Full Course. URL: <https://www.youtube.com/watch?v=9f-GarcDY58>
- Paper: TinyML-Enabled Frugal Smart Objects.

## Raspberry PI

- RaspberryPI and Node-Red: Free Raspberry Pi Tutorial - Internet de las cosas con Raspberry Pi - Curso inicial | Udemy <https://www.udemy.com/course/internet-de-las-cosas-con-raspberry-pi-curso-inicial/>

## Redes IoT

- 6lowpan, Zigbee, Zwave: Free Wireless Networking Tutorial - Wireless Technologies for IoT | Udemy <https://www.udemy.com/course/wireless-technologies-for-iot/>
- Lorawan: Free Internet Of Things Tutorial - The Things Academy: Understand LoRaWAN ® Fundamentals | Udemy <https://www.udemy.com/course/lorawan-fundamentals/>

## Python

- Python: Free Python Tutorial - Introduction To Python Programming | Udemy <https://www.udemy.com/course/pythonforbeginnersintro/>

## Python REST JSON

- Python-REST-JSON: Accediendo a los Datos de la Web con Python: Web Scrapping y APIs | edX [https://www.edx.org/es/course/accediendo-a-los-datos-de-la-web-con-python-web-scrapping-y-a-pis?index=spanish\\_product&queryID=3ef8535e647a29c4841f11a267f5c20b&position=1](https://www.edx.org/es/course/accediendo-a-los-datos-de-la-web-con-python-web-scrapping-y-a-pis?index=spanish_product&queryID=3ef8535e647a29c4841f11a267f5c20b&position=1)
- REST API with Python and Flask. <https://www.udemy.com/course/flask-rest-api-with-swagger-documentation/>

## Javascript, Web Developing

Por favor, continua con tu formación en remoto en desarrollo Web con Javascript, framework Vue.js y demás herramientas que te paso a continuación.

El siguiente curso es bastante interesante sobre python y javascript, tiene muchos más temas que puedes saltarte sobre Django, html, css, etc.

CS50's Web Programming with Python and JavaScript. 100h | edX [https://www.edx.org/es/course/cs50s-web-programming-with-python-and-javascript?index=spanish\\_product&queryID=6d83f85162bd76e90d488b4b5721e4f0&position=1](https://www.edx.org/es/course/cs50s-web-programming-with-python-and-javascript?index=spanish_product&queryID=6d83f85162bd76e90d488b4b5721e4f0&position=1)

JavaScript, jQuery, and JSON | Coursera <https://es.coursera.org/learn/javascript-jquery-json>

Tutorial | Vue.js (vuejs.org) [https://urldefense.com/v3/\\_\\_https://vuejs.org/tutorial/\\*step-1\\_/lw!!D9dNQwwGXtA!SnjU9HG4OjqfHggc07d70321F6ueqqiFp4kijbJfXY2eaSDKwTKLKHBWE7LmXODsIAcVXAQwZvE8PmOXTZE6w\\$](https://urldefense.com/v3/__https://vuejs.org/tutorial/*step-1_/lw!!D9dNQwwGXtA!SnjU9HG4OjqfHggc07d70321F6ueqqiFp4kijbJfXY2eaSDKwTKLKHBWE7LmXODsIAcVXAQwZvE8PmOXTZE6w$)

Además, 2 herramientas (Bootstrap, Semantic-ui) son para la parte visual para los elementos y el estilo de los formularios, sólo para tema de apariencia sin funcionalidad ninguna.

<https://semantic-ui.com/>

<https://getbootstrap.com/docs/5.3/>

Para la consulta de formatos de tiempo en js: <https://momentjs.com/>

Para recordar las reglas del CSS: <https://htmlcheatsheet.com/css/> Video para saber utilizar vuetify: <https://www.google.com/search?q=como+a%C3%B1adir+una+columna+de+botones+a+vuetify+2&>



rlz=1C1UEAD\_esES980ES980&oq=como+a%C3%B1adir+una+columna+de+botones+a+vuetify+2&aqs=chrome..69i57j0i546.20031j0j15&sourceid=chrome&ie=UTF-8#fpstate=ive&vld=cid:6b8ef41f,vid:pMSp0L7AuN8

Herramienta de testeo web automatizada. Playwright. Fast and reliable end-to-end testing for modern web apps.

<https://playwright.dev/>

<https://playwright.dev/docs/intro>

<https://playwright.dev/docs/test-configuration>

## ChatBot - LLM - NLP - procesamiento de lenguaje natural.

Te envío algunas propuestas de cursos y guías sobre procesamiento de lenguaje natural que creo que pueden ser interesantes. Como hablamos ayer, siempre puedes buscar otros por tu cuenta, sobre todo conforme vayas sumergiéndote en los desarrollos para entender mejor algunos conceptos o descubrir nuevas técnicas.

Estos dos son más genéricos, para una primera introducción:

<https://www.udemy.com/course/introduction-to-natural-language-processing-nlp-llm-ai-gate-moyyn/>

<https://www.udemy.com/course/natural-language-processing-python-nlp/>

Este de aquí se centra en las técnicas de zero-shot, few-shot y chain of thought:

<https://developers.google.com/machine-learning/resources/prompt-eng?hl=es-419>

Este es para que veas el funcionamiento de Hugging Face, aunque ya me dijiste que lo conocías:

<https://www.coursera.org/projects/open-source-models-with-hugging-face?action=enroll>

Y este último es sobre algunas métricas de evaluación:

<https://unite.ai/es/evaluaci%C3%B3n-de-modelos-de-lenguaje-grandes-una-gu%C3%ADa-t%C3%A9cnica/>

## AI/ML para Python.

- Free Machine Learning Tutorial - The Top 5 Machine Learning Libraries in Python | Udemy.  
<https://www.udemy.com/course/the-top-5-machine-learning-libraries-in-python/>
- Free NumPy Tutorial - Learn NumPy Fundamentals (Python Library for Data Science) | Udemy.  
<https://www.udemy.com/course/python-numpy-fundamentals/>
- Free Pandas Tutorial - Pandas with Python | Udemy.  
<https://www.udemy.com/course/pandas-with-python/>

## Cursos sobre Python, Yolov8 y Redes Neuronales para procesamiento de imágenes de cámaras.

Para ello antes te tienes que familiarizar con el procesamiento de imágenes, redes convolucionales y en concreto con YOLOv8 que es el modelo que estamos usando para este tipo de desarrollos. Te paso en este mismo correo enlaces de interés.

[https://youtube.com/playlist?list=PL-Ogd76BhmcB9OjPucsnc2-piEE96jJDQ&si=t8tKupH\\_L5tpInOC](https://youtube.com/playlist?list=PL-Ogd76BhmcB9OjPucsnc2-piEE96jJDQ&si=t8tKupH_L5tpInOC)

<https://docs.ultralytics.com/es>

<https://youtube.com/playlist?list=PLZCA39VpuaZZ1cjH4vEldXlb0dCpZs3Y5&si=XuxMWNMIINeAlwOe>

<https://www.diarioabierto.es/556879/la-inteligencia-artificial-reconoce-al-mosquito-tigre-en-una-fotografia>

- Enlace al vídeo Tratamiento de imágenes de cultivos:  
<https://www.youtube.com/watch?v=O8qdsIKoNAo>
- Enlace al vídeo ¿Cómo funcionan las redes neuronales?:  
<https://www.youtube.com/watch?v=IQMoglp-fBk>

## Cursos sobre Python y Earth Data Science para procesamiento de imágenes satelitales.

- Earth Data Science Courses & Textbooks | Earth Data Science - Earth Lab  
<https://www.earthdatascience.org/courses/>
- Calculate Vegetation Indices in Python | Earth Data Science - Earth Lab. Learn how to calculate vegetation indices from multispectral remote sensing data in Python.  
<https://www.earthdatascience.org/courses/use-data-open-source-python/multispectral-remote-sensing/vegetation-indices-in-python/>
- What is Lidar Data | Earth Data Science - Earth Lab. Lidar is an active remote sensing technique that measures vegetation height.  
<https://www.earthdatascience.org/courses/earth-analytics/lidar-raster-data-r/lidar-intro/>
- Enlace al curso 'Introduction to Remote Sensing in Python (Jupyter)':  
<https://youtu.be/gi4UdFsayoM>
- Enlace al curso 'Introduction to Remote Sensing in Python. (jupyter)':  
<https://hub.gke2.mybinder.org/user/yohman-workshop-remote-sensingpptgj542/notebooks/Remote%20Sensing%20Camp.ipynb>
- Enlace al curso Remote Sensing Image Acquisition, Analysis and Applications:  
<https://www.coursera.org/learn/remote-sensing/>
- Enlace al curso 'Multispectral Remote Sensing Data in Python':  
<https://www.earthdatascience.org/courses/use-data-open-source-python/multispectralremote-sensing/>
- Enlace al curso Convolution Neural Networks for Image Processing - Using Keras:  
<https://towardsdatascience.com/convolution-neural-network-for-image-processing-usingkeras-dc3429056306>
- Enlace al curso Neural Networks for Image classification: Tensorflow and Keras:  
[https://www.modeldifferently.com/en/2021/10/image\\_classification/](https://www.modeldifferently.com/en/2021/10/image_classification/)

## TinyML MOOCs

- Course: IBM Corporation. Machine Learning with Python: A Practical Introduction. URL:  
<https://www.edx.org/es/course/machine-learning-with-python-a-practical-introduct>.
- Course: UCI. Introduction to the Internet of Things and Embedded Systems. URL:  
<https://www.coursera.org/learn/iot>.

## Estudio de EstadoDelArte en Github y en Google-Scholar sobre trabajos previos y desarrollos previos del problema a solventar sobre la plaga de plantación de arroz.

<https://github.com/search?q=rice+insect+detection>

[https://scholar.google.com/scholar?hl=es&as\\_sdt=0%2C5&as\\_ylo=2017&q=rice+insect+detection+cn&btnG=](https://scholar.google.com/scholar?hl=es&as_sdt=0%2C5&as_ylo=2017&q=rice+insect+detection+cn&btnG=)

- Hacer un listado con los desarrollos y trabajos previos, indicando referencias, lenguajes de programación, repositorios de código.
- Seleccionar los más interesantes con Manolo para instalarlos y testarlos localmente.
- Seleccionar el modelo o red neuronal que queremos mejorar.

## Fase 3: Entrenar, avanzar y mejorar el modelo con la combinación de parámetros y herramientas adicionales.

- Entrenar el modelo o red neuronal con las imágenes disponibles en repositorios abiertos o privados.
  - Analizar la precisión del modelo o red neuronal para la detección de insectos en las plantaciones de arroz.
  - Mejorar la precisión y porcentaje de acierto del modelo para la detección de insectos.

Optimizadores en redes neuronales:

<https://velascoluis.medium.com/optimizadores-en-redes-neuronales-profundas-un-enfoque-pr%C3%A1ctico-819b39a3eb5>

Funciones de activación:

<https://jahazielponce.com/funciones-de-activacion-y-comopuedes-crear-la-tuya-usando-python-r-y-tensorflow/>

Transformers: <https://viso.ai/deep-learning/vision-transformer-vit/>

Clasificación de imágenes y Transformers:

<https://towardsdatascience.com/usingtransformers-for-computer-vision-6f764c5a078b>

Transformers en Keras: [https://keras.io/examples/nlp/text\\_classification\\_with\\_transformer/](https://keras.io/examples/nlp/text_classification_with_transformer/)

Capsule Networks: <https://blog.paperspace.com/capsule-networks/>

Attention Mechanisms:

<https://www.analyticsvidhya.com/blog/2019/11/comprehensiveguide-attention-mechanism-deep-learning/>

## Docker y Kubernetes

- Free Docker Tutorial - Docker Essentials | Udemy - 3h  
<https://www.udemy.com/course/docker-essentials/>
- Docker for absolute beginners (coursera.org)  
<https://es.coursera.org/projects/docker-for-absolute-beginners>

- Containerization Using Docker (coursera.org)  
<https://es.coursera.org/projects/containerization-using-docker>
- Introduction to Containers, Kubernetes and OpenShift | edX  
[https://www.edx.org/es/course/introduction-to-containers-kubernetes-and-openshift?index=spanish\\_product&queryID=39fcc25aa7d7026587d914ebf7cdf8&position=3](https://www.edx.org/es/course/introduction-to-containers-kubernetes-and-openshift?index=spanish_product&queryID=39fcc25aa7d7026587d914ebf7cdf8&position=3)
- Kubernetes: Introduction to Kubernetes | edX  
[https://www.edx.org/es/course/introduction-to-kubernetes?index=spanish\\_product&queryID=dd557e6db00e949866fcdae2545e4d42&position=1](https://www.edx.org/es/course/introduction-to-kubernetes?index=spanish_product&queryID=dd557e6db00e949866fcdae2545e4d42&position=1)
- Kubernetes on Edge: Introduction to Kubernetes on Edge with K3s | edX  
[https://www.edx.org/es/course/introduction-to-kubernetes-on-edge-with-k3s?index=spanish\\_product&queryID=f243097e387b224f1597971644aa7be4&position=4](https://www.edx.org/es/course/introduction-to-kubernetes-on-edge-with-k3s?index=spanish_product&queryID=f243097e387b224f1597971644aa7be4&position=4)
- Kubernetes en Hyper-AI (diapositiva 20):  
[https://transfer.odins.es/z74HOIy9J3/HYPER-AI\\_GA2\\_WP5\\_CERTH.pptx](https://transfer.odins.es/z74HOIy9J3/HYPER-AI_GA2_WP5_CERTH.pptx)

## Blockchain, Hyperledger Fabric.

- Introduction to Hyperledger Blockchain Technologies | edX  
[https://www.edx.org/es/course/introduction-to-hyperledger-blockchain-technologie?index=spanish\\_product&queryID=ab4107cf98fddb85b0b61d3c89b330cd&position=1](https://www.edx.org/es/course/introduction-to-hyperledger-blockchain-technologie?index=spanish_product&queryID=ab4107cf98fddb85b0b61d3c89b330cd&position=1)
- A Blockchain Platform for the Enterprise — hyperledger-fabricdocs main documentation  
<https://hyperledger-fabric.readthedocs.io/en/release-2.5/>

## QA software testing for Web, Mobile App, REST APIs

- Become Software Tester - A Complete Learning path to be a QA. Free tutorial. Rating: 4.6 (208 ratings) 5,064 students 1hr 17min of on-demand video. Udemy.  
<https://www.udemy.com/course/become-software-tester/>
- Cucumber, Selenium WebDriver & Java - in under 2 Hours! - [New 2023] Free tutorial. Rating: 4.7 (2,127 ratings) 48,748 students 1hr 45min of on-demand video. Udemy  
<https://www.udemy.com/course/cucumber-selenium-java-develop-a-framework-in-25-hours/>
- Selenium WebDriver with Python scripting language. Free tutorial. Rating: 4.6. (310 ratings) 14,588 students 1hr 54min of on-demand video. Udemy.  
<https://www.udemy.com/course/selenium-webdriver-with-python-crash-course/>
- Cucumber & Java & Selenium automation framework - JASECU. Free tutorial. Rating: 4.8 (45 ratings) 4,098 students 1hr 59min of on-demand video. Udemy.  
<https://www.udemy.com/course/jasecu-ui-api-automation-framework/>
- Selenium Webdriver - How to Do Mouse and Keyboard Actions. Free tutorial. Rating: 4.3. (653 ratings) 3,979 students 1hr 7min of on-demand video. Udemy.  
<https://www.udemy.com/course/selenium-webdriver-how-to-do-mouse-and-keyboard-actions/>
- Appium for Mobile Automation Testing. Free tutorial Rating: 3.6 (1,995 ratings) 49,008 students 28hr 51min of on-demand video. Udemy  
<https://www.udemy.com/course/appium-selenium-for-mobile-automation-testing/>

## Back-End y Front-End

- NODE-RED. Para realizar el backend de comunicaciones Node-RED (nodered.org).  
<https://nodered.org/>
- MONGODB. Como base de datos para el backend. MongoDB Documentation

<https://docs.mongodb.com/>

- GRAFANA. - El frontend para visualizar los datos. Grafana: The open observability platform | Grafana Labs <https://grafana.com/>

Puedes encontrar videos en Youtube y manuales en internet que explican como combinar esas herramientas para crear tu propio backend y frontend.

- Grafana showing MQTT data served by NodeRED - YouTube <https://www.youtube.com/watch?v=9nZtiwD8wGc>
- MongoDB dashboard for Grafana | Grafana Labs <https://grafana.com/grafana/dashboards/2583>
- NODE RED | MONGODB CONNECTION USING NODE RED - YouTube <https://www.youtube.com/watch?v=zRRQCEov-4Q>

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