



# TRAINING COURSES

## ELECTRONICS TECHNICIAN WITH A FOCUS ON CONNECTED OBJECTS



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#### 1. Onl'fait

- 2. The Fab Labs
- **3. Connected objects** and rapid prototyping
- 4. Main objectives
- 5. Trade skills
- 6. Target audience
- 7. Methodology
- 8. Time table

**ONL'FAIT** 

In October 2017, Onl'fait, a non profit organisation, opened the first Fab Lab in Geneva thanks to the G'innove programme, managed by the Agenda 21 service. Onl'fait is a space open to all around digital craftsmanship, which provides its community with technical, technological, and human resources. The aim is to offer a varied community of professionals and enthusiasts the tools to repair, develop, prototype or even create a product. Onl'fait is also an intergenerational and multicultural meeting place to reflect on an ecological, local and sustainable approach to technology and consumption. A Fab Lab is also a global sharing network where members are in turn beneficiaries and contributors, with experiences being pooled to optimise global innovation.

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### THE FAB LAB

The first vocation of Onl'fait is in the field of education and development. Fab Labs are seen as an innovation in technological education, to train skilled labour and enhance learning through practice in STEM (science, technology, engineering and mathematics) disciplines. In terms of economic development, Fab Labs are the perfect embodiment of technological innovation with a social purpose, enabling the application of local designs on an international scale without compromising their content. These two ingredients suggest that the integration of Fab Labs into local economies will create new jobs and income in a growing collaborative economy. In general, Fab Labs are gaining more and more interest as tools for revitalising the economy of a city or even a country.



### CONNECTED OBJECTS AND

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### **RAPID PROTOTYPING**

The vocational training courses that Onl'fait offers consist of textiles, carpentry and the Internet of Things and include training in the use of specific machines techniques, participation in the life of Onl'fait and the development of a personal project.

In Fab Labs, many users work on projects involving electronics, particularly in the field of the Internet of Things and embedded electronics. The tools of the fablab are often used for the prototyping of new products. In addition to electronics, digitally controlled machines such as 3D printers, laser cutters, vinyl cutters and digital milling machines are used to design and produce these prototypes.

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Electronic

#### Welding, wiring and assemble components to place them in a compartment



## MAIN OBJECTIVES

nable approach.

The training course aims to renewupgrade the participants' knowledge of craft, transitioning to a more digital and sustai-

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### **BUSINESS SKILLS**

- Programming an Arduino microcontroller
- · Write and execute a code to program a smart object
- Identify the path of the data from a physical sensor to its processing in a web application
- Build an Internet-connected object (based on Arduino) capable of interacting with other objects
- Use a software library (to control motors, lights, sound...)
- Solder, wire, assemble the elements and place them in a box
- Describe how to create an object with a numerical control machine

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## TARGET AUDIENCE

Qualified candidate science.

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Qualified candidates in the fields of electronics or computer

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## METHODOLOGY

Participants divide their time between :

#### Learning sessions 7.1.

- Electronic circuits
- Programming
- Rapid prototyping
- Digital modeling
- LoRa network or other communication technologies

#### 7.2. Work on Onl'fait comissions for an active learning pedagogy

- Apply acquired skills in concrete contexts
- Learn to work in a team
- Manage deadlines, make an estimate, respond to customers, etc.

#### 7.3. Development of a personal project chosen

Stimulate autonomy and time management and present one's personal project at the end of the training course

#### 7.4. And more...

Alternating theory and practice

- Individualized follow-up by professionals in the field
- Personalized training according to needs
- Distribution of work time (training/work/personal project development) varies from week to week
- Each week concludes with the updating of a Wiki journal (documentation of acquired skills, mandates to which the candidate has contributed, progress of their personal project)
- Bimonthly and final assessment (job skills + soft skills)

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### **CALENDAR**

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#### TOPICS

- rules

- communication tools of Onl'fait
- Introduction to the Arduino microcontroller

#### **OBJECTIVES**

- tructions
- Have access to internal communication tools
- Know how to use the Arduino IDE

### EXTERNAL RESOURCES

- coursera.org
- Arduino IDE & Arduino.cc
- Wiki Onl'fait •

#### TIME ALLOCATION WEEK 1



#### The training course lasts between 4 and 6 months at 80%

Presentation of Onl'fait, objectives, functioning, team and safety

Visit of the Fab Lab Onl'fait and presentation of the machines Introduction to the Wiki, documentation and communication

Visit of the MACO and the associations that make it up

· Integrate into the life of Onl'fait, respect schedules and safety ins-

Create an Onl'fait wiki account and prepare the home page

Plateforme MOOC France Université Numérique



Introduction to digital fabrication and the world of fablabs

#### **OBJECTIVES**

- Integrate into the life of Onl'fait, respect schedules and safety instructions
- Have access to internal communication tools
- Update your personal training journal on the Onl'fait wiki
- Discover and learn about the machines and the functioning of a fablab •

### **EXTERNAL RESOURCES**

- Plateforme MOOC France Université Numérique
- coursera.org
- Arduino IDE & Arduino.cc
- Wiki Onl'fait



#### TOPICS

Introduction to Arduino microcontroller

#### **OBJECTIVES**

- Know how to use the Arduino IDE
- Test examples provided with the Arduino
- Update your personal training log on the Onl'fait wiki

#### **EXTERNAL RESOURCES**

- Plateforme MOOC France Université Numérique
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- Arduino IDE & Arduino.cc
- Wiki Onl'fait

### **TIME ALLOCATION WEEKS 2 & 3**

#### **60% TRAINING**

25% PERSONAL ASSIGNEMENTS PROJECT

15%



### TOPICS

Introduction to Arduino microcontroller

#### **OBJECTIVES**

- Know how to use the Arduino IDE
- Modify an existing code .
- Update your personal training log on the Onl'fait wiki

### **TIME ALLOCATION WEEK 4**

# **60% TRAINING** WEEK 5 TOPICS

Introduction au microcontroleur Arduino

#### **OBJECTIVES**

- Know how to use the Arduino IDE .
- Test examples provided with the Arduino
- Update your personal training log on the Onl'fait wiki •
- Use libraries code

### **TIME ALLOCATION WEEK 5**









- Laser cutting induction
- Software induction: Inkscape and Lightburn

#### **OBJECTIVES**

- Know how to vectorise drawings with Inkscape
- Know how to use laser cutter with Lightburn
- Know how to adapt the settings of the machine according to the materials used •
- Update your personal training log on the Onl'fait wiki



#### TOPICS

- 3d printing induction
- Software induction: Cura

#### **OBJECTIVES**

- Know how to use a slicer (Cura)
- Know the main parameters used for 3d printing •
- Know how a 3d printer works and its settings •
- Update your personal training log on the Onl'fait wiki



#### TOPICS

Training for 3d modeling software : OpenSCAD

#### **OBJECTIVES**

- Know how to use OpenSCAD
- · Carry out the modeling exercises requested
- Update your personal training log on the Onl'fait wiki

#### **TIME ALLOCATION WEEK 6,7 & 8**



**30% ASSIGNEMENTS** 

**30% PERSONAL** PROJECT



#### TOPICS

· 3d modeling software induction: OpenSCAD

#### **OBJECTIVES**

- Know how to use Open SCAD
- Modeling a box for an assembly of electronics
- Update your personal training log on the Onl'fait wiki

# WEEK **10**

#### TOPICS

Make a connected object

#### **OBJECTIVES**

- Follow the MOOC .
- Programming the Internet of Things
- Complete the required exercises •
- Update your personal training log on the Onl'fait wiki

#### **TIME ALLOCATION WEEK 9 & 10**





• Make a connected object

#### **OBJECTIVES**

- Follow the MOOC
- Programming the Internet of Things •
- Complete the required exercises •
- Update your personal training log on the Onl'fait wiki



### TOPICS

• Make a connected object

#### **OBJECTIVES**

- Make a CO2 sensor (or water quality measurement)
- Print a box with the 3d printer for the sensor
- Update your personal training log on the Onl'fait wiki



#### TOPICS

• Make a connected object

#### **OBJECTIVES**

- Create a CO2 sensor (or water quality measurement)
- Cut and laser engrave a front panel for the connected object •
- Adding functionality •
- Documenting the project •
- Update your personal training log on the Onl'fait wiki

### **TIME ALLOCATION WEEK 11, 12 & 13**

#### **30% TRAINING**

**40% ASSIGNEMENTS** 

**30% PERSONNAL** PROJECT



#### TOPICS

LoRa Network

#### **OBJECTIVES**

- Discovering how a LoRa network works •
- · Update your personal training log on the Onl'fait wiki

### **TIME ALLOCATION WEEK 14**





LoRa network

#### **OBJECTIVES**

- Discover the functioning of an object connected to the LoRa network
- Realise an object connected to the LoRa network from example
- Update your personal training log on the Onl'fait wiki



#### TOPICS

• LoRa network

#### **OBJECTIVES**

- Create an object connected to the LoRa network
- Document its realization
- Update your personal training log on the Onl'fait wiki

#### **TIME ALLOCATION WEEK 15 & 16**

<b>30% TRAINING</b>	40% ASSIGNEMENTS	30% PERSONNAL PROJECT
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#### **EXTRAS**

3d modeling software Shaper Origin Vinyl cutting E-textiles Soft sensors & actuators