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ministère éducation nationale

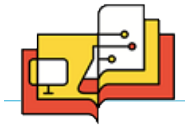
Basilio Focaccia
Istituto Tecnico Tecnologico

Lycée La Fayette
Champagne-sur-Seine • Fontaineroux

« Project Virtual Student »

Franco-Italian project

SIN ITEC

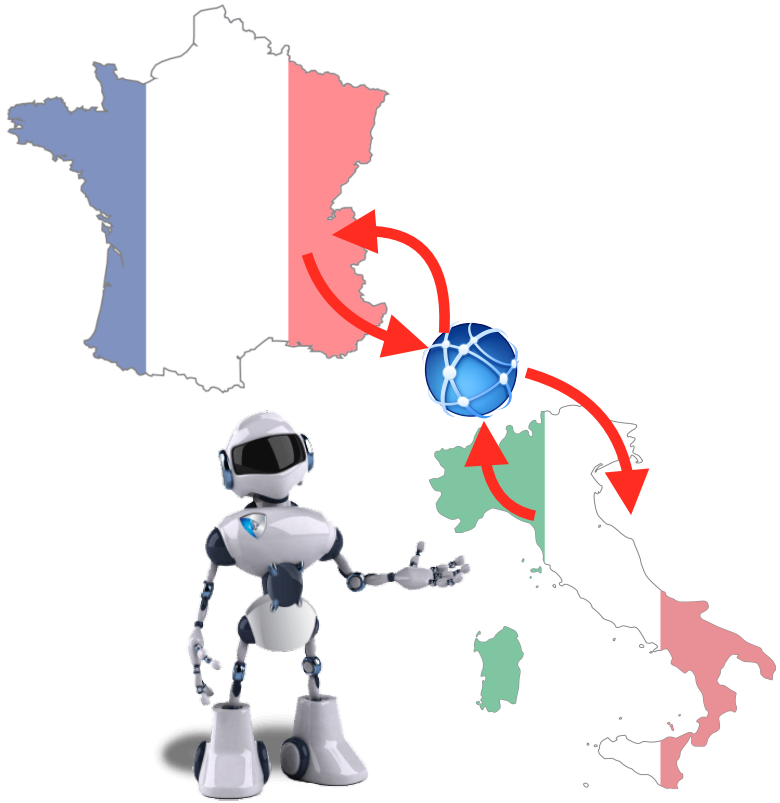


M. Desideri
M. Doublet

2017-2018

Project title

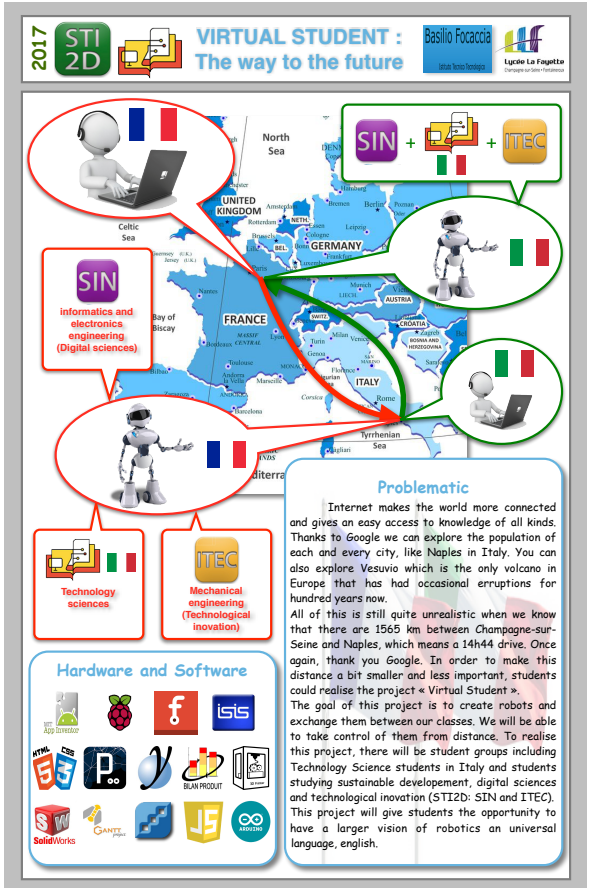
- **Virtual Student:**
  The way to the future. Control a robot from another place on Earth.



The project's objectives

- Find a solution for a particular need
- Validate technical solutions
- Team work
- Work in a foreign language (english)
- Multidisciplinary work
- Manage a project
- [...]

Problematic



- Internet makes the world more connected and gives an easy access to knowledge of all kinds. Thanks to Google we can explore the population of each and every city, like Naples in Italy. You can also explore Vesuvio which is the only volcano in Europe that has had occasional erruptions for hundred years now.
All of this is still quite unrealistic when we know that there are 1565 km between Champagne-sur-Seine and Naples, which means a 14h44 drive. Once again, thank you Google. In order to make this distance a bit smaller and less important, students could realise the project « Virtual Student ».
The goal of this project is to create robots and exchange them between our classes. We will be able to take control of them from distance. To realise this project, there will be student groups including Technology Science students in Italy and students studying sustainable developement, digital sciences and technological inovation (STI2D: SIN and ITEC).
This project will give students the opportunity to have a larger vision of robotics an universal language, english.

The concept of Sustainable Development

- Ecological
- Social
- Economic

The steps of a project :

- **Preliminary conception (first step):**

Specificate the project and the problems, get familiar with the concept of sustainable development through the research and the chain of information and energy

- **Datailed conception (second step) :**

GANTT chart, procedure for the system implementation, comparative study and the justification of the chosen solutions, evaluation of the costs and the solution itself, the diagrams SysML

- **Prototype:**

Diagram and the plan of the chosen prototype, the system parameters, the algorithm, the code and the integration of the subsets.

- **Tests:**

Measurement protocol for tests, validation of tests for specifications, performance and integration gaps, installation sheets or system maintenance sheet, technology watch.

Provisional timetable

Séquence 1 (Découverte)
Séquence 2 (Processing)
Séquence 3 (Codage de l'information)
Séquence 4 (Algèbre booléenne)
Séquence 5 (Flowcode)
Séquence 6 (Arduino)
Séquence 7 (Site Web)
Séquence 8 (Mini-projet)
Séquence CCF (Algoréa Langage C)

zone C
Créteil, Montpellier, Paris, Toulouse, Versailles

Program 1STI2D SIN 2017/2018

Estimated time

Phases	Duration
Preliminary conception:	5
Detailed conception	25
Prototype	25
Tests	5
TOTAL	60 h (12 weeks x 5h)

French students

Number of students :

- 16 students in electronics and computer sciences (SIN)
- 12 students in mechanical sciences (ITEC)

Student âge :

- Between 15 and 17 years old

Student level:

SIN (Electronics and computer sciences):

Processing (« java »), Information coding schemes, Boolean Algebra, Flowcode (advanced graphical programming language for microcontrollers), Arduino (« C/C++ »), Website creation (HTML5, CSS3), basic electronics…

ITEC (mehanical sciences):

Solidworks (Computer assisted design), materials resistence, Sustainable development, general mechanics,..

Tasks break-down (1/3) :

Italian students and French students in computer science:

- **Duo 1:**

Should develop a system which permits a robot to move. All the information about the robot will be visible on a screen that will be placed on its body.

- **Duo 2:**

Should develop a system which permits a robot to follow a line on the floor. All the information about the robot will be visible on a screen that will be placed on its body.

- **Duo 3:**

Should develop a system which permits to detect if robot falls. All the information about the robot will be visible on a screen that will be placed on its body.

- **Duo 4:**

Should develop a system which permits to follow the robot's activity in a real-time via a web page. All these information for all the robots should be transmitted on a web page via internet.

Tasks break-down (2/3) :

Italian students and French students in computer science:

- **Duo 5:**

Should develop a system which permits to detect any obstacle in front of a robot. All the information about the robot will be visible on a screen that will be placed on its body.

- **Duo 6:**

Should develop a system of a hand which permits a robot to take and move the objects. All the information about the robot will be visible on a screen that will be placed on its body.

- **Duo 7:**

Should develop a system which permits to manipulante a robot with vocal controls. All the information about the robot will be visible on a screen that will be placed on its body.

- **Duo 8:**

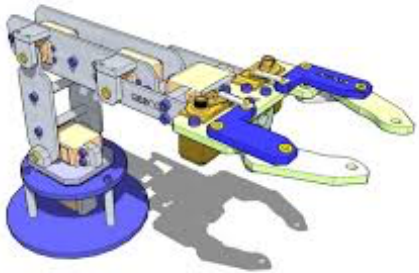
Should develop a system which permits to manipulante a robot with wireless joystick commands. All the information about the robot will be visible on a screen that will be placed on its body.

Break-down of tasks (3/3)

French students in mechanical sciences:

- **Goup 1:**

Robot & hand



- **Group 2:**

Joystick

- **Group 3:**

Moving system

Estimated price

Name	Amount	Price Estimate	Price Estimate total
Arduino mega	2	40	80
Arduino uno	1	20	20
Accelerometer	1	10	10
Servo-motor	5	5	25
DC machine	2	10	20
Carte Motor Shield	1	30	30
Screen	1	70	70
Raspberry pi	1	40	40
ip camera	1	50	50
Joystick	2	3	6
Button	5	0,20	1
Ultrasonic sensor	1	5	5
Shield Ethernet	2	45	90
Shield Bluetooth	2	25	50
Voice command	1	50	50
Cool for 3D printer	1	30	30
TOTAL	/	/	577

Synoptic of the project

2018 STI 2D — VIRTUAL STUDENT : The way to the future — Basilio Focaccia — Lycée La Fayette

Functional robot synoptic (x2)

Robot 1 (« Name 1 »)		
Italy:	STI2D SIN:	STI2D ITEC:
-Name 1	-Name 1	-Name 1
-Name 2	-Name 2	-Name 2
-Name 3	-Name 3	-Name 3
-Name 4	-Name 4	-Name 4
-Name 5	-Name 5	-Name 5
-Name 6	-Name 6	-Name 6
-Name 7	-Name 7	
-Name 8	-Name 8	

Robot 2 (« Name 2 »)		
Italy:	STI2D SIN:	STI2D ITEC:
-Name 9	-Name 9	-Name 7
-Name 10	-Name 10	-Name 8
-Name 11	-Name 11	-Name 9
-Name 12	-Name 12	-Name 10
-Name 13	-Name 13	-Name 11
-Name 14	-Name 14	-Name 12
-Name 15	-Name 15	
-Name 16	-Name 16	

Duo 1 | Duo 2 | Duo 3 | Duo 4 | Duo 5 | Duo 6 | Duo 7 | Duo 8

Group 1: Robot & hand
Group 2: Joystick
Group 3: Moving system

Duo 6: (Name 6+ Name 6)
Group 1: (Name 1+ Name 2)
Duo 3: (Name 3+ Name 3)
Duo 4: (Name 4+ Name 4)
Duo 5: (Name 5+ Name 5)
Duo 7: (Name 7+ Name 7)
Group 3: (Name 3+ Name 4)
Duo 1: (Name 1+ Name 1)
Duo 2: (Name 2+ Name 2)
Duo 4: (Name 4+ Name 4)
Duo 8: (Name 8+ Name 8)
Group 2: (Name 3+ Name 4)

Group distribution:

Robot 1:		Robot 2:	
SIN	× 16		× 16
ITEC	× 6	ITEC	× 6
Or			
SIN	× 8	SIN	× 8
ITEC	× 6	ITEC	× 6
	× 8		× 8

If

Robot 1 (« Name 1 »)

Robot 2 (« Name 2 »)

2/2

Teachers contact information

Project manager:

- **Vincenzo Zaccardo**

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Professor of méchanics:

- **Philippe Desideri**

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language spoken: English, French

Professor of electronics and computer science:

- **Stephen Doublet**

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language spoken: English, French, Croatian

Questions