

**ISTITUTO di ISTRUZIONE
SECONDARIA SUPERIORE
EINAUDI-CASAREGIS-GALILEI**



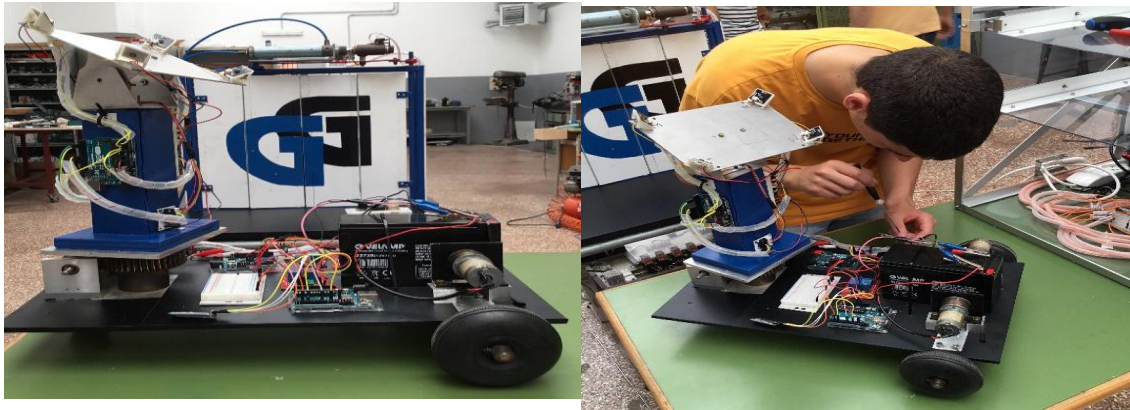
**ERASMUS PLUS PROGRAMME KA 2
STRATEGIC PARTNERSHIP 2017-2020
EUROPEAN SCHOOLS GO GREEN!
A PROJECT ON SUSTAINABILITY:
THINK GLOBAL, ACT LOCAL!**



**PROJECTS DESIGNED BY
THE STUDENTS OF
GALILEO GALILEI
TECHNICAL HIGH SCHOOL
USING ARDUINO**

DUAL AXIS

SOLAR TRACKER



What is it?

The solar tracker is a device made up of a solar panel able to follow the movement of the sun. Its main structure consists of a tower with a solar panel on the top, which can rotate around two axis.

How does it work?

There are four photo sensors, positioned on the corners of the solar panel that read the value of light and send data to Arduino. Then, Arduino processes the information and drives the motors in order to move and rotate the solar panel. Furthermore, the dual axis solar tracker may move like a car if driven by a smart phone or any other electronic device connected to Bluetooth.



SAFETY VAULT

What is it?

The safety vault is a space created to store values and documents of considerable importance or secrecy frequently found in banks.

How does it work?

The project consists in the simulation and testing of the security system in a safety vault, also said *caveau* from the French word. Inside it there are sensors of various types connected to the same alarm powered by Arduino.

There is also a keypad outside the safety vault that gives the correct input to open or close the main gate. If the sensors inside the safety vault reboot, a signal to Arduino system is sent, asking to boot off the security system and trigger the alarm.



BUS DOORS SYSTEM

What is it?

This system can be operated in two ways: via PLC or relay.

How does it work?

After choosing whether to make it work by PLC (Programmable Logic Controller) or by a relay via a selector, you need to press the green button to activate the doors.

For this project a PLC of the *MOELLER KLOCKNER* has been used, programmed using the AWL language, with six relays, one of which with three switches, four with four switches and one bi-stable relay.

There is also an anti-crushing system that reopens the doors if an obstacle is detected between them.

GREENHOUSE WITH TEMPERATURE CONTROL



What is it?

This is the prototype of a greenhouse with an automatic switch to control the temperature inside it.

How does it work?

The greenhouse works in such a way that by pressing a switch the light turns on. Under the light bulb, there is a heat sensor that is used to detect the temperature and by the electro-pneumatic connections it moves a piston with three limit switches which are used to decide the opening of the part above the greenhouse that contributes to the cooling of the environment together with a fan.

When the temperature is restored to the standards imposed by the program or if the greenhouse lid is lowered, the cover is reduced by one level or completely closed.

In addition to the autonomous system, there are three buttons that are used to send the piston back and forth manually if necessary. There is also a stopping key in case the piston must be held in position for a given period of time.

COCKTAIL MACHINE



What is it?

This machine can prepare four types of cocktails.

How does it work?

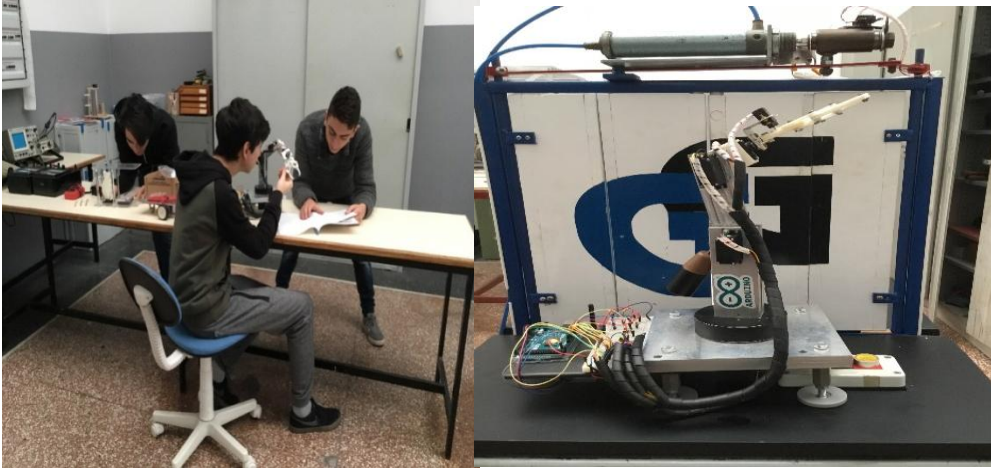
First you must enter the code corresponding to the beverage that you want drink and you must press the confirmation button that is located on the keyboard.

After the engine starts working, thanks to a sliding trolley, you must place the glass under the container with the desired beverage. The limit switches will control the quantity of liquid and a solenoid valve will accordingly release the right quantity of drink chosen by the programmer.

After the machine has finished its preparation cycle, it is possible to withdraw the beverage produced.

The memory chip stores four codes that are used to empty all the liquid tanks, thus allowing a maintenance of the system.

ROBOTIC ARM



What is it?

It is a robotic arm that uses five electric engines able to do different movements.

How does it work?

The arm can store the movements that you memorize manually and reproduce them by itself. The arm uses a set of pliers that have been 3D printed to grab objects. The base of the robotic arm is made of metal and is equipped with four adjustable legs to keep its stability. To control the engines' movements Arduino Mega has been used. It can also be controlled by a mobile phone thanks to Arduino's App. To remember the movements it uses tracking sensors that drive Arduino. Pressing a button the information stored can recreate the movements previously made.

SNACK AUTOMATIC MACHINE



What is it?

This machine is an automatic distributor of snacks.

How does it work?

By inserting a specific code, you can get the snack you wish, thanks

to Arduino micro controller.

It consists of a mechanical spiral which is powered by a small motor, letting the food drop. An ultrasonic sensor, placed on one side of the structure, sends a signal that blocks the motor making the spiral stop at the end of the operation.

METAL SEPARATOR



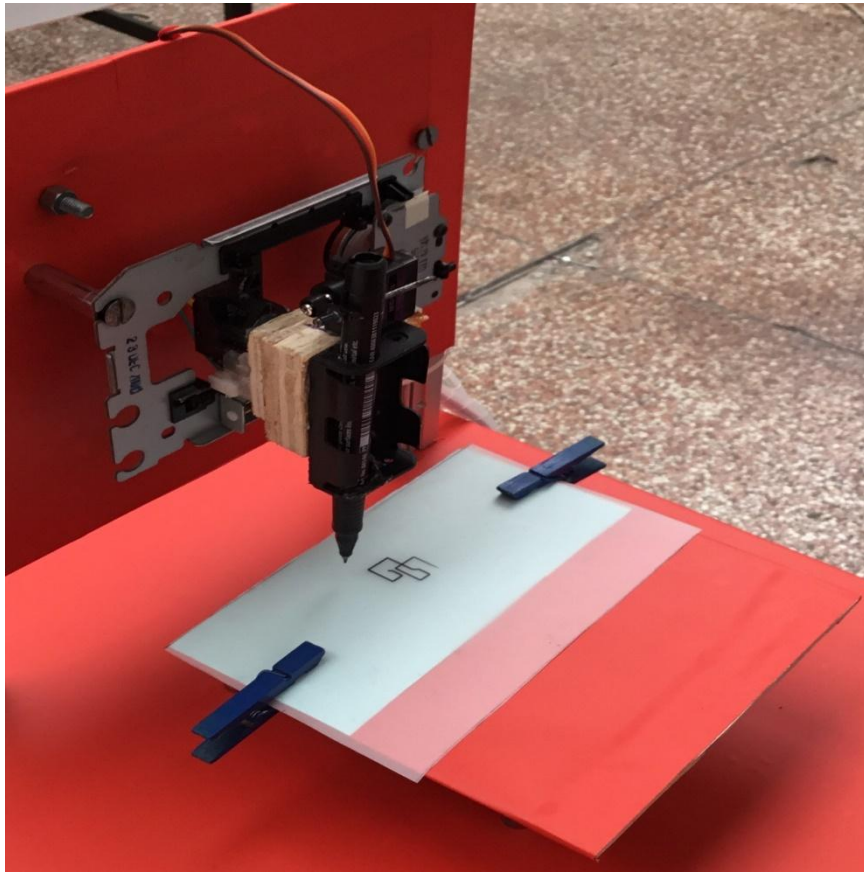
What is it?

The metal separator is an automatic machine controlled by PLC (Programmable Logic Controller) and it is able to divide metals from non-metals.

How does it work?

It consists of a conveyor belt which can change its direction of rotation in order to separate the two different types of material in different containers, placed at two opposite sides.

PLOTTER



What is it?

It is a machine that can reproduce very precise drawings.

How does it work?

It works with Arduino and it is driven by electric motors. A pen follows the precise movements stored as lists of coded instructions sent by Arduino.

OFF-ROAD WHEELCHAIR



What is it?

It is a different wheelchair because it is capable of climbing up and down any stairs and slopes up to 30°, overcoming obstacles and crossing dirty paths.

How does it work?

A system of wheels and tracks are combined with two electric motors.

The frame is made of wood, and at the top of it there are some front LEDs, so that they can light the road. Some rear LEDs are also present in order to detect one's presence. The padding of the seat is made of foam rubber, the lining of fabric to offer a greater comfort to the passenger. The Perspex mudguards provide protection and the rear anti-tip wheel prevents the chair from tipping over.