HYDROPONIC HOUSE SYSTEM

instruction manual
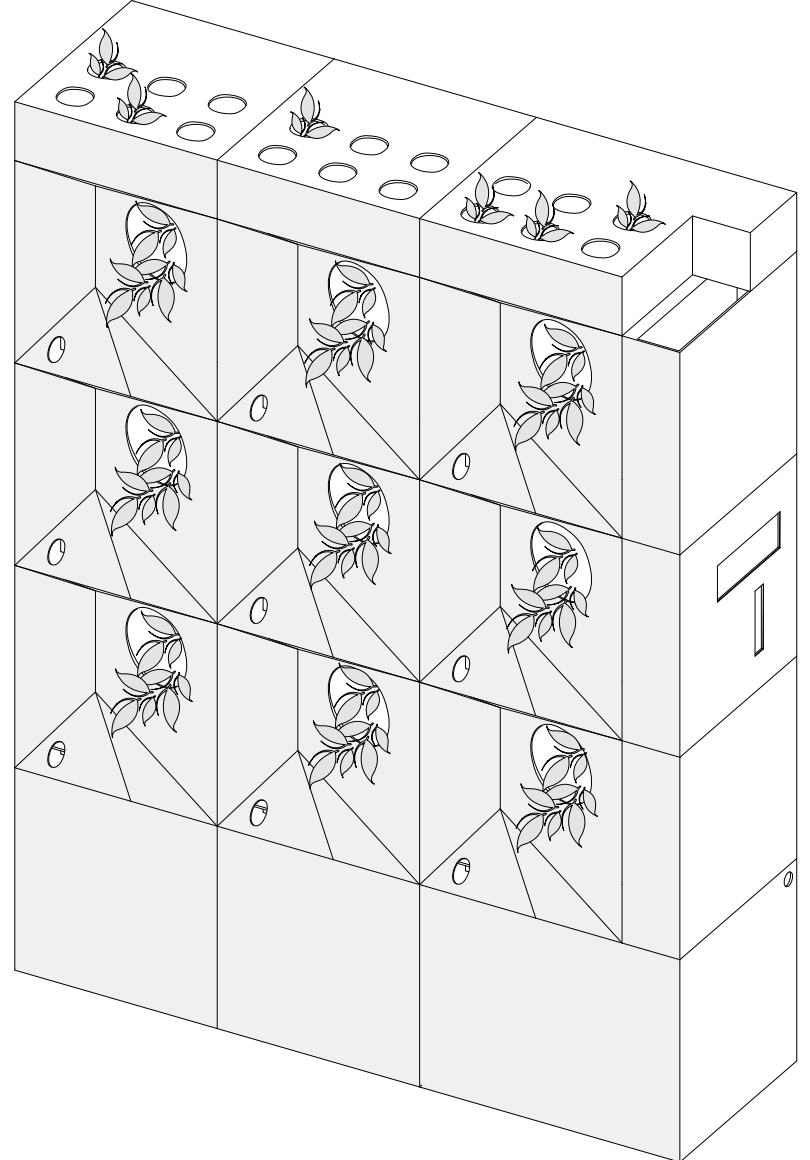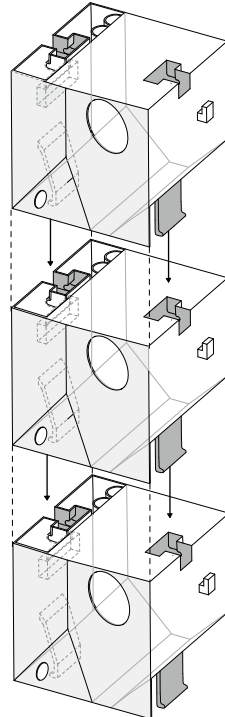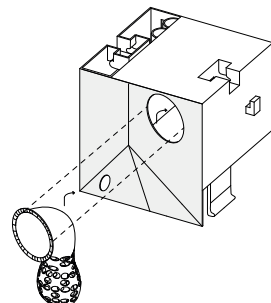
Some simple steps.

The following system is designed to create a module for growing hydropo-nics home of small vegetables. Before starting the construction of your hydroponic system, you have to choose plants that you are going to grow. In fact, for each type of vegetation you'll need to choose: the amount and the typology of nutrients to dissolve in the water; the type of LED to be purchased for the production of particular Light Frequency, and the optimal pH for the water. Additionally, please keep in mind that some types of seeds can be planted together with many benefit because of some properties that are exchanged between them thanks to the water circulating in the hydroponic system. However, some vegetation types are not recommended together, because they need different characteristics of nourishment. Our hydroponic house system has been designed for small plants. It also has the ability to germinate the seeds of your plant.

For more info abut the cultivation in hydroponics, you can visit these link: http://en.wikipedia.org/wiki/Hydroponics

If you need to cultivate plants with special features, not hesitate to change the design or the characteristics of the hydroponic system and let's send to us any changes and implementations of the project! In this way, we can upload your edited project on our website and we can share it with others. We remind you that our system is the first version and it is could be implemented by your wits. Keep in mind that the results could change in relation to CNC technologies and to electronic tools that you'll use. Please, share with us your changes and the results of your cultivation.
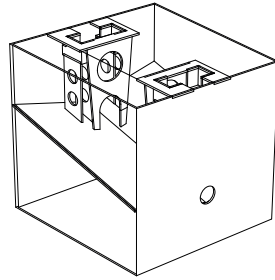
Have fun!
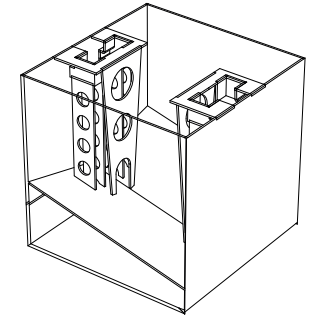
www.medaarch.com
medfablab@medaarch.com

1. Form printing

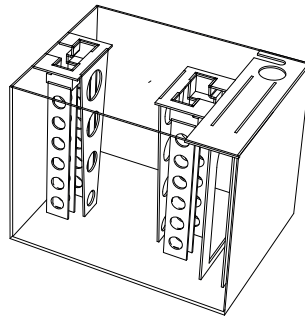To create a hydroponic system you need to print the following modules:
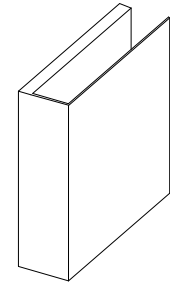
- tank module with supply tank (x1)
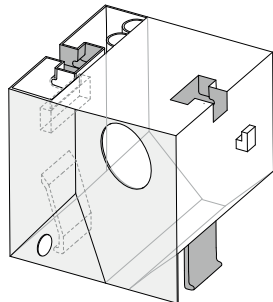
- Central form tank (x1)

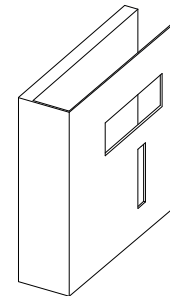- buffer tank with accommodation for hydraulic pump (x1)

- Side closure module (x2)

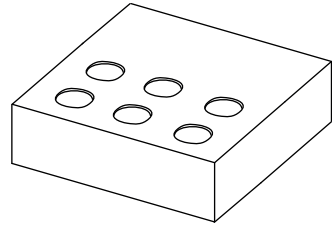- basic hydroponic module (x9)

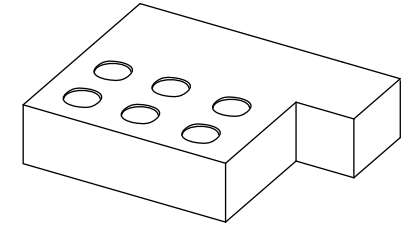- side closure form with accommodation for Arduino (x2)

1. Form printing

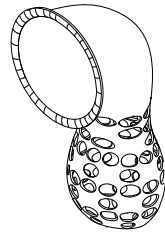- upper closure module (x2)

- module upper closure (x1)

- support plan module (x9)

2. Hydraulic system

To realize the hydraulic system you must purchase the following items:

- ≈1,5 meters linear pipeline with section of the pump used

- 1 centrifugal multi-purpose water pump

- fittings for the pipes

3. Arduino system

To realize Arduino system you must have the following items:

RELAY
(proportionate to the transformer's power)

Transformer
(proportionate to the LED's type)

LED
(power and color in relation to the type of vegetation)

Control system accommodation

Display LCD

Card: Arduino One

Potentiometer

SENSORS

PH sensor

Temperature sensor

RELAY
(proportionate to the pump's power)

Humidity sensor

Centrifugal pump
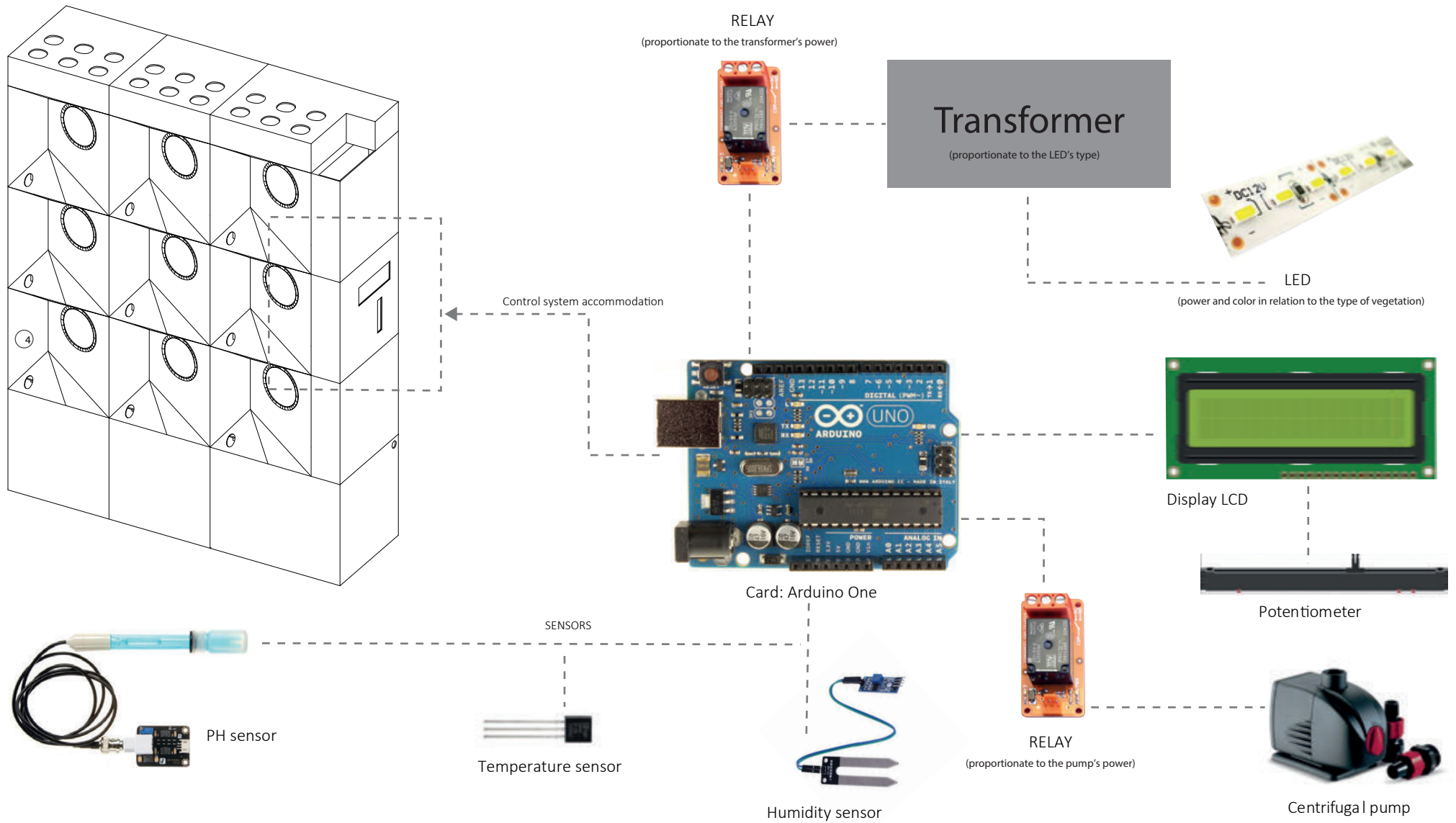
4. Drawing scheme

To assemble the hydroponic house system, you need to follow these steps:

- Step 1:
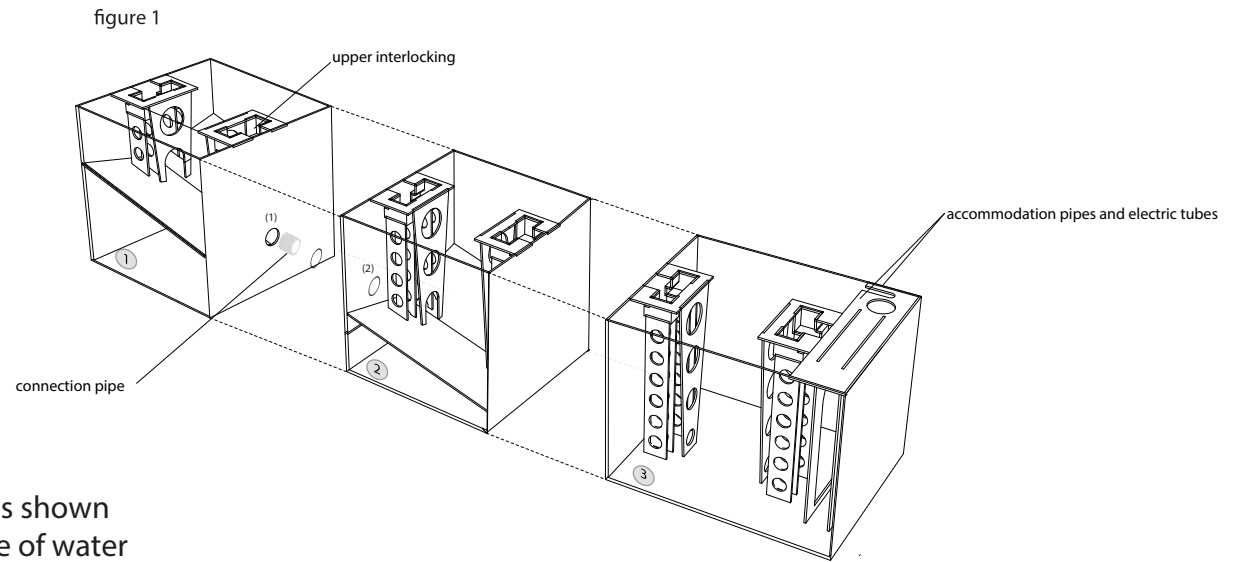
Place the tank modules as shown in Figure 1
Insert the connection pipe (1) that protrude from the
first module in the holes of the next module (2)

figure 1

upper interlocking

(1)

(2)

accommodation pipes and electric tubes

connection pipe

1

2

3

- Step 2:

Insert inside the module tank n°3, the hydraulic pump (as it is shown
in Figure 2) with the relative piping which will ensure the rise of water
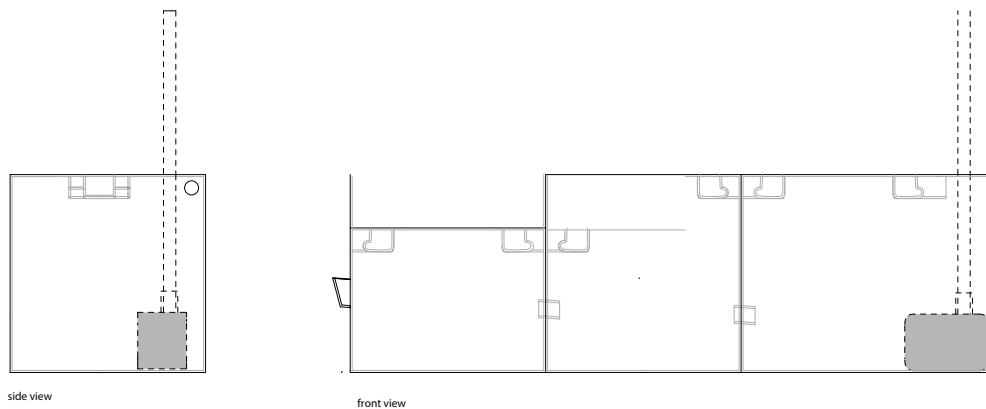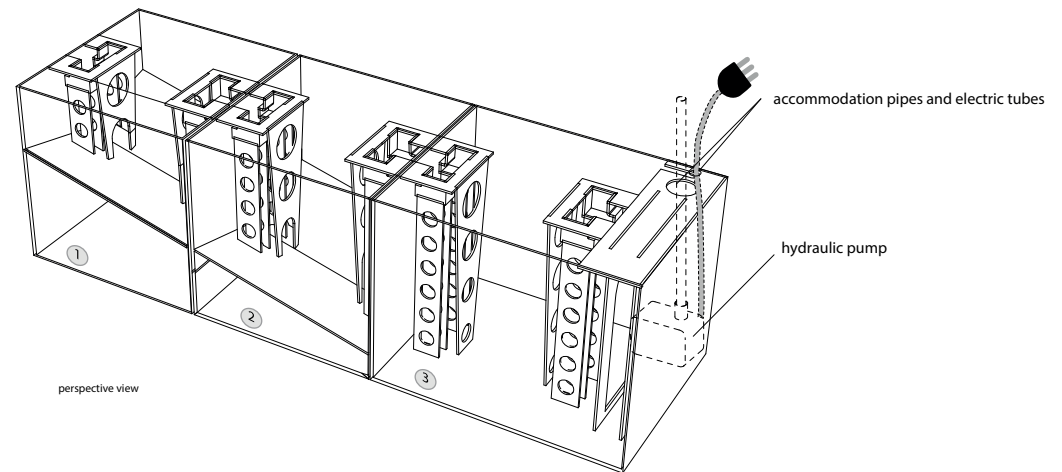up to the superior modules.

figure 2

side view

front view

accommodation pipes and electric tubes

hydraulic pump

perspective view

1

2

3

4. Drawing scheme

- Step 3:

  Cut the led strip by the amount necessary to vegetation choice (1) and glue it in place on the base module (2); route the power cords through the hole (3) and connect it to the cables led strip placed on the next module (4); lengthen the connection cables until they exit from the top of the base module (5) as it is shown in Figure 3.
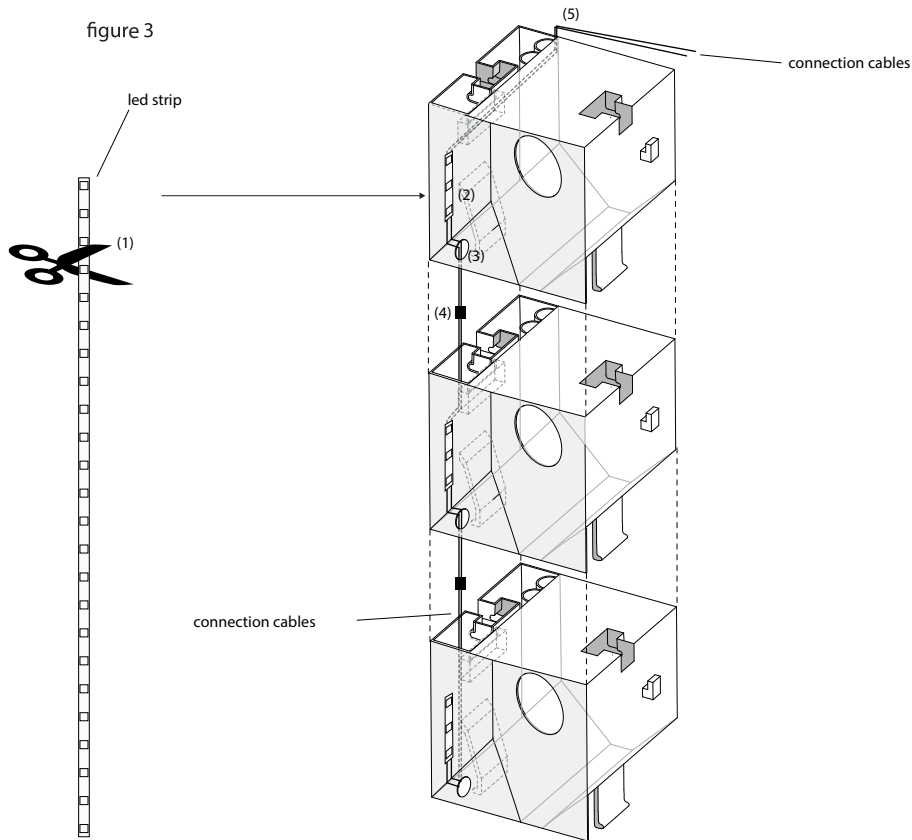
- Step 4:

 Assemble in column three basic modules inserting properly the lower interlocking in the joint top, as shown in Figure 4.

figure 3

led strip

(1)

(2)

(3)

(4)

(5)

connection cables

connection cables

figure 4

lower interlocking

upper interlocking
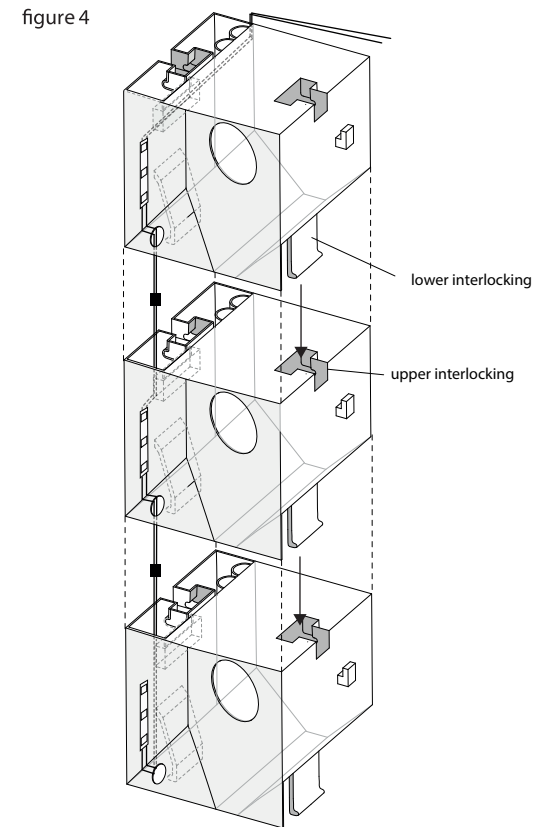
Drawing scheme

- Step 5:
  Form three columns of three basic modules and assemble them pushing the interlocking lateral into the recess side (1) and slide it to the bottom of the recess (2); simultaneously connect the power cables of the LED (3) as it is shown in Figure 5.
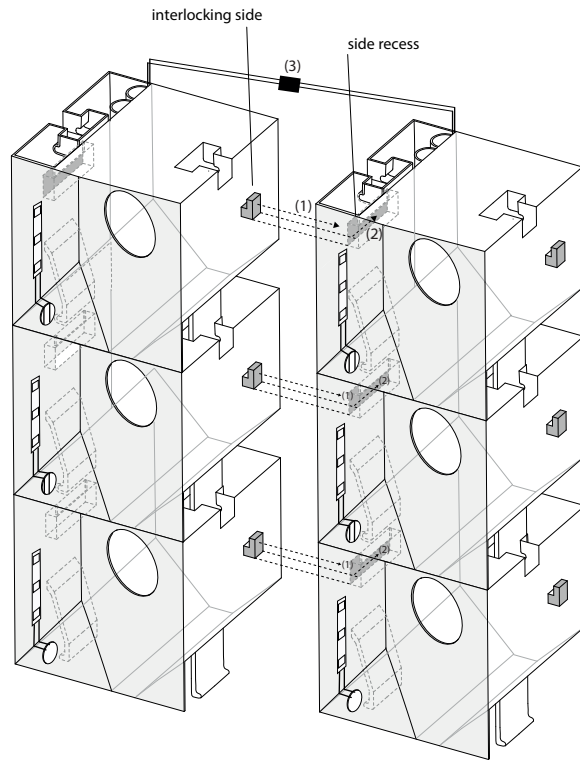
- Step 6:
  Assemble the system consists by nine basic modules with three tank modules previously mounted using the special joints, as it is shown in Figure 6.

figure 5

interlocking side

side recess

(3)

(1)

(2)
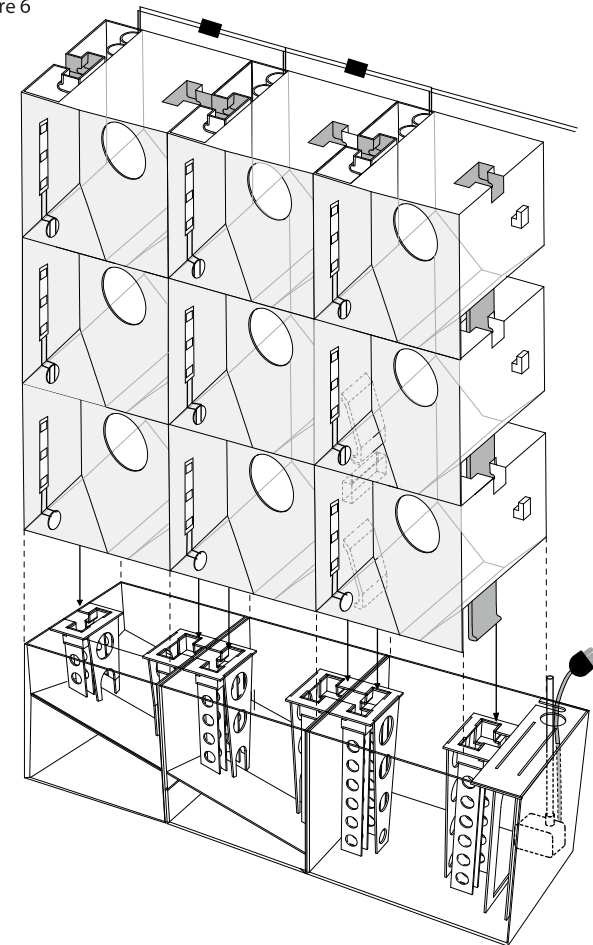
figure 6

4. Drawing scheme

- Step 7:
  Assemble the hydraulic system using the pipes cut to size and fitting them, as it is shown in Figure 7. Then, enter the same into the slot on modules tank, as it is shown in the magnifyted figure.
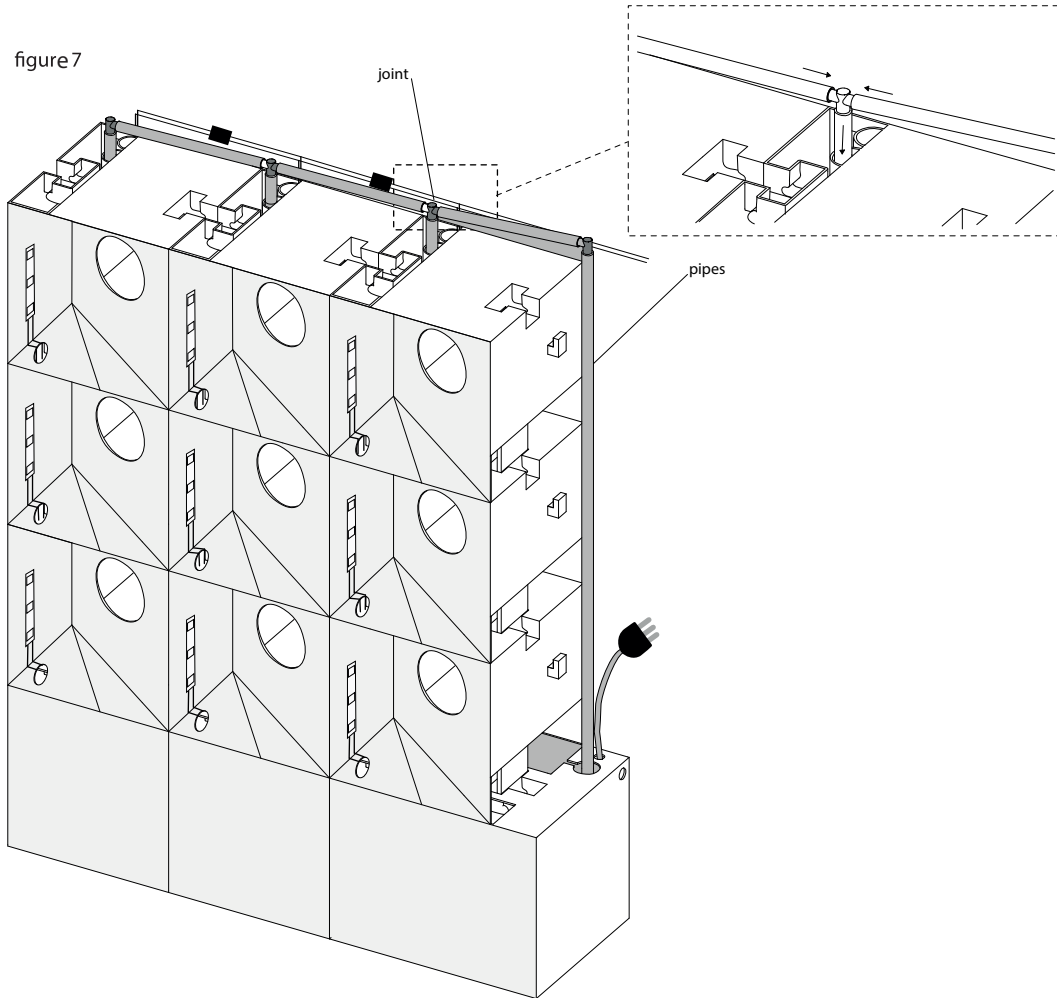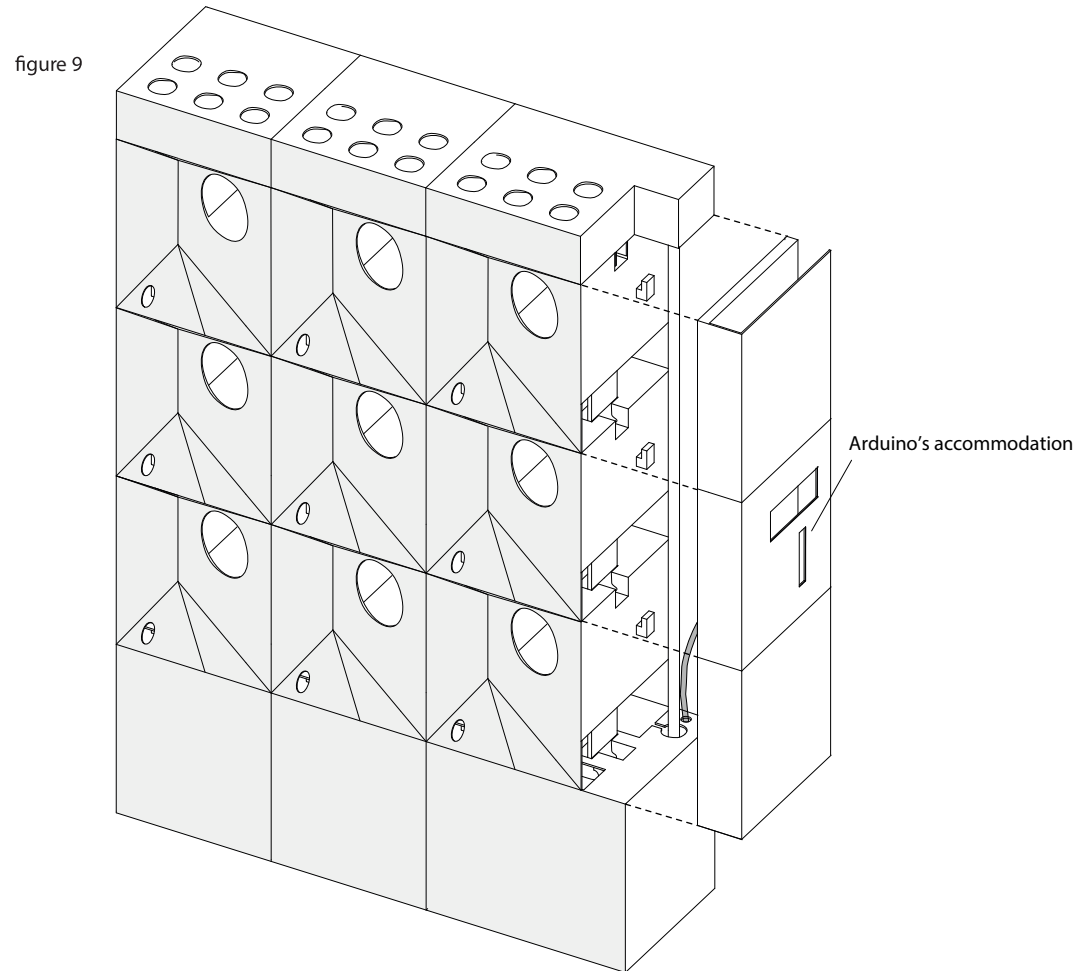
- Step 8:
  Insert the upper closing modules as it is shown in Figure 8. These modules are provided with accomodation for sprouts.

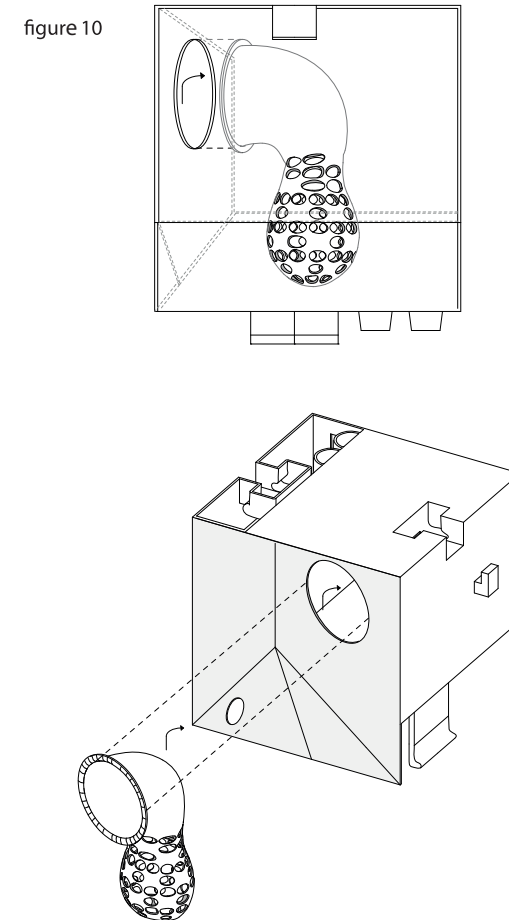figure 7

joint

pipes

figure 8

plant's accommodations
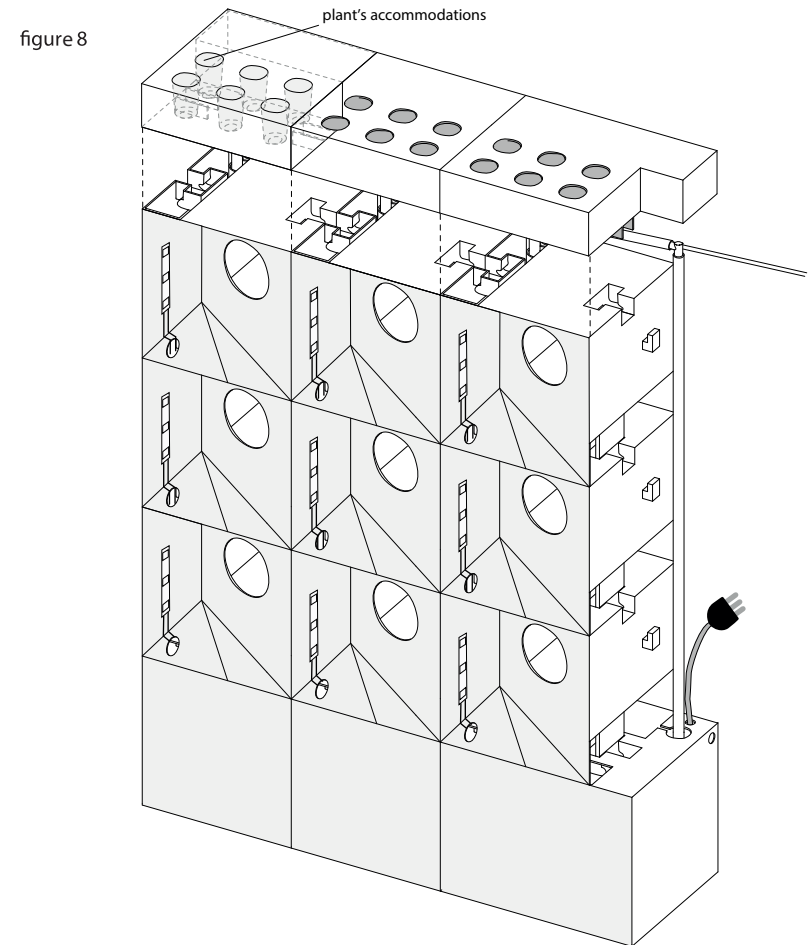
4. Drawing scheme

- Step 9:
  Assemble the side modules as it is shown in Figure 9.
  The central module has opening for Arduino's accomodation.
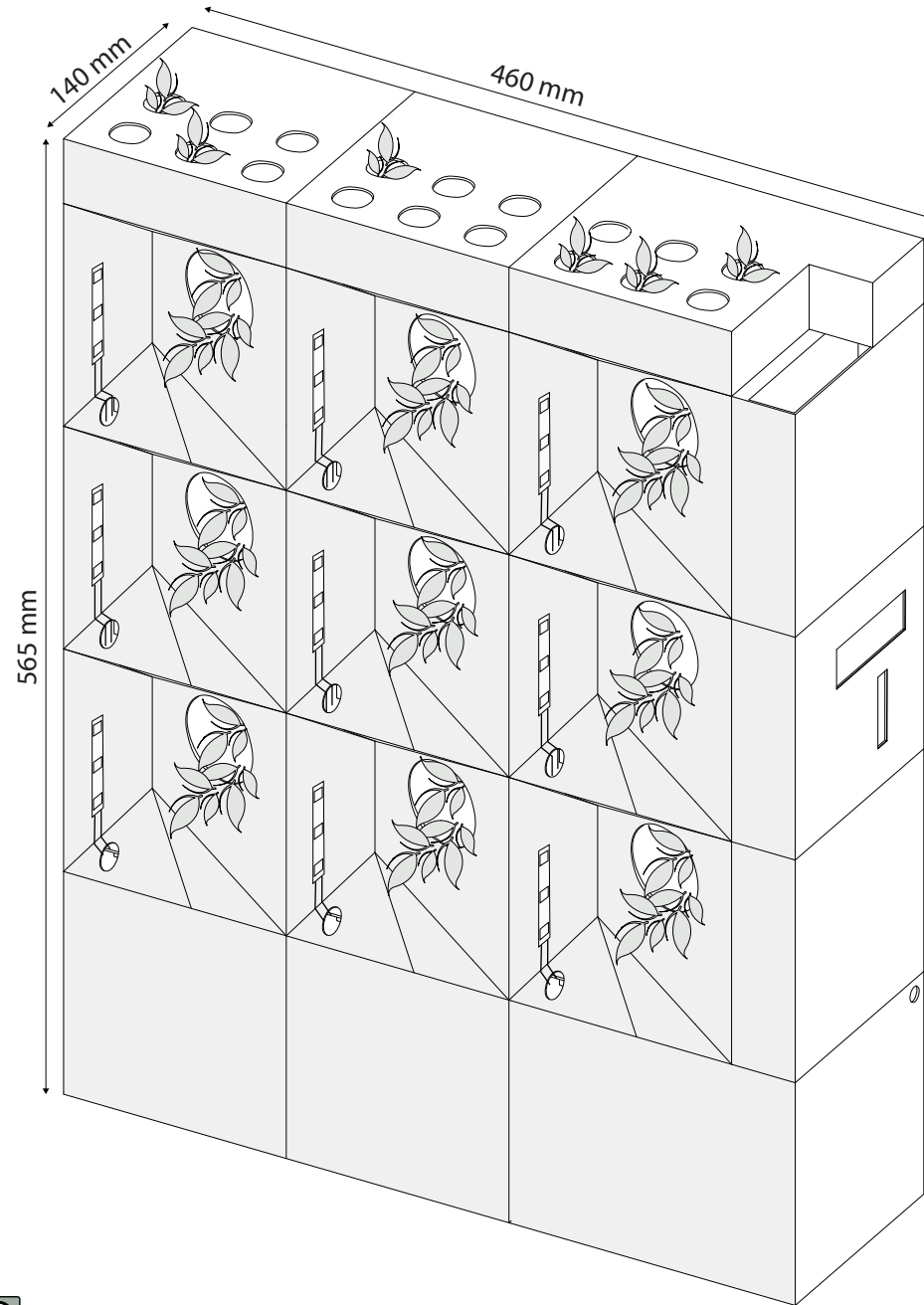
- Step 10:
  Insert the module for the support of the seedling in the housing, as it is shown in Figure 10.
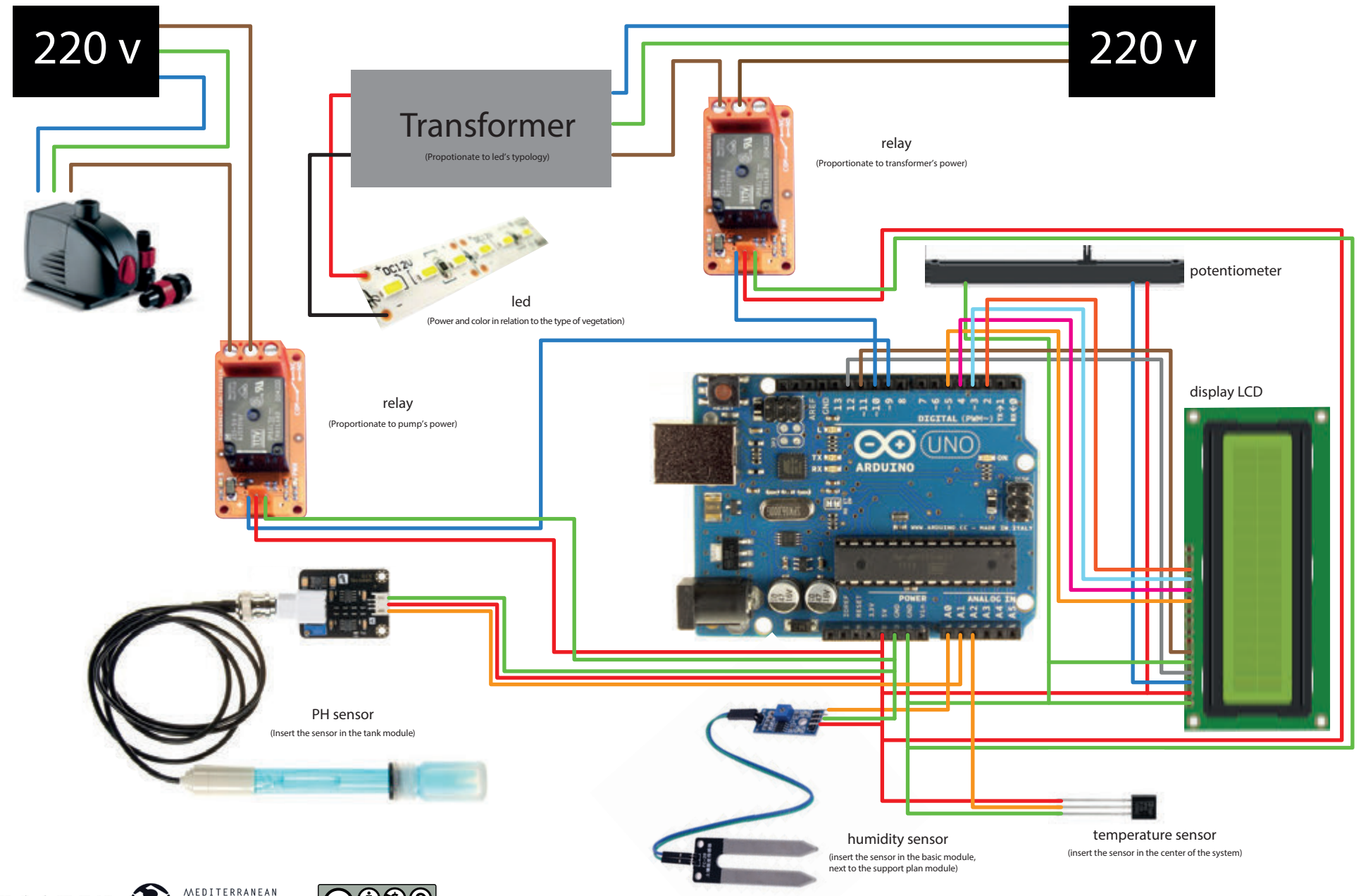
figure 9

Arduino's accommodation

figure 10

4. Drawing scheme

- Step 11:
  Enjoy with your hydroponic house system!

5. Wiring scheme of Arduino's system

220 v

220 v

Transformer
(Propotionate to led's typology)

relay
(Proportionate to transformer's power)

led
(Power and color in relation to the type of vegetation)

potentiometer

display LCD

relay
(Proportionate to pump's power)

PH sensor
(Insert the sensor in the tank module)

humidity sensor
(insert the sensor in the basic module,
next to the support plan module)

temperature sensor
(insert the sensor in the center of the system)

The research described in this paper, was developed at Mediterranean Fablab, by:

Gianpiero Picerno Ceraso - project coordinator;
Antonia Gravagnuolo - design modules;
Amleto Picerno Ceraso - project coordinator;
Amedeo Di Marco - 3D printing implementation;
Emanuela Lanzara - designer;
Simona Sestu - designer;
Francesca Luciano - communication;
Matteo Saturnino and Gianluca Lambiase - graphic design.

The project was exhibited at Maker Faire Rome 2014, as a research project of Medaarch - Mediterranean FabLab.

You can download project's file here:
http://www.thingiverse.com/thing:820751

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