Complex of Technical Schools in Grudziądz

Automation & Robotics LAB

Laboratory manual

Basics of Robotics

Building of flora habitat called #FloraHab.

Prepared by: Marcin Jabłoński, Msc Eng.

Even the best-designed space base cannot go without people. We, in turn, need food - the way out of this situation is the #FloraHab mini kennel.

1. Introduction

The project called #FloraHab is a development of the ESA Project - European Space Agency "Teach with Space - Plants on Mars, Build an automatic plant watering system". Our project will be more technically advanced! The ESA project described how to implement only an automatic plant watering system for soil cultivation.

2. Type of farm

In our project, we first plan to carry out soilless cultivation - hydroponics. Hydroponics is the cultivation of plants without soil. In the hydroponic garden, we can grow flowers, herbs and even vegetables. In the hydroponic garden you will not find traditional pots with soil. Of course, the plants cannot be placed directly in the water, because most types of flora would then start rotting from the roots. The underground parts of the plants are immersed in a plastic dish, which is filled with an inert substrate, for example, expanded clay, soaked with water and nutrients. The roots have direct contact with water and easy access to nutrients, which is why they do not grow excessively. In natural conditions, for example, orchids and bromelia develop, which grow attached to branches and trunks.

Advantages of hydroponic cultivation

In the cultivation of plants on a large scale, the following are the advantages of the solution:

- lush crops - sowing is dense, and plant growth and development faster,

- saving water for watering plants,

- the possibility of establishing farms in dry and unsuitable areas for cultivation (e.g. Moon Station),

- lower plant contamination with heavy metals, pesticides, parasites or mold germs,

- no soil fatigue phenomenon - you can grow any plants, including the same species,

- flowering and fruiting may also occur out of season.

3. Lighting

Another development of the ESA project will be the use of artificial LED light for plant breeding. We build our Habitat #FloraHab in such a way as to completely cut off plants from sunlight. Total lighting for plant growth will be provided by a specially selected light color. The lighting will be adjusted automatically.

4. Heating

The habitat will also be autonomously heated through a heating foil located on the bottom, under the pot. Due to the planned breeding of thermophilic plants, it is necessary to ensure a temperature above 20 degrees Celsius. Temperature adjustment will take place automatically.

5. Airing

The farm will also be artificially ventilated by a system of two fans (supply and exhaust) working together.

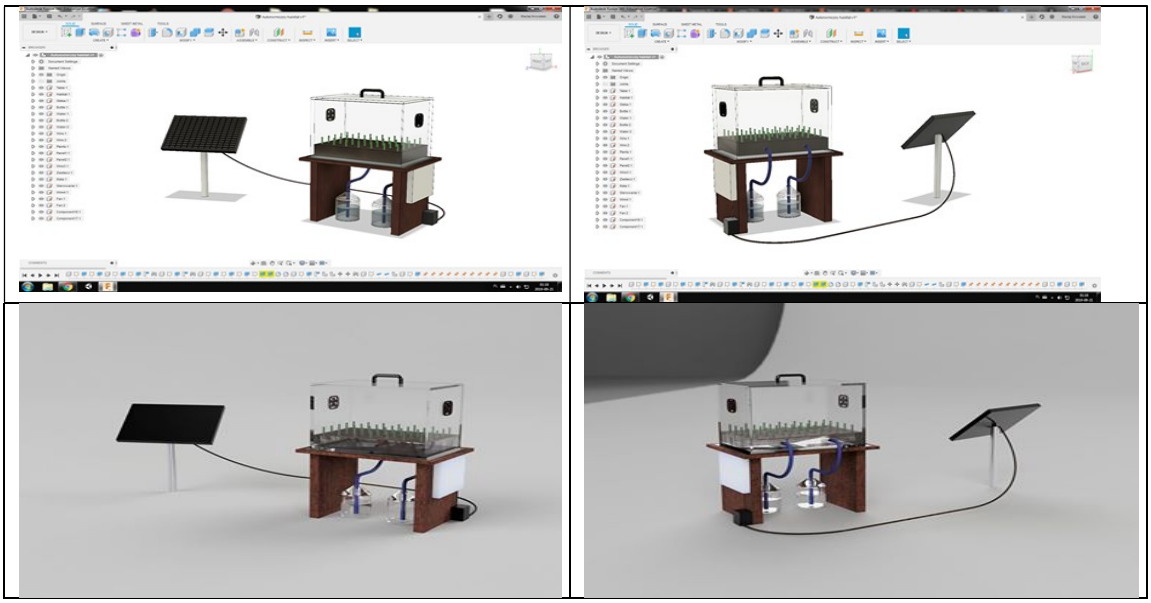
6. Power supply

The system power supply will be at 12V DC, from the set PV panel + battery, as a support the possibility of power supply from the regulated laboratory power supply is planned.

7. Control

The control system will be implemented based on the Arduino MEGA module with a set of appropriate sensors for lighting, temperature, humidity, etc. The switching on and off of individual elements will be implemented by a 3-channel relay for the Arduino system.

8. Visualizations



Visualizations: Maciej Kowalski - Autodesk Fusion 360.

9. Authors of the project:

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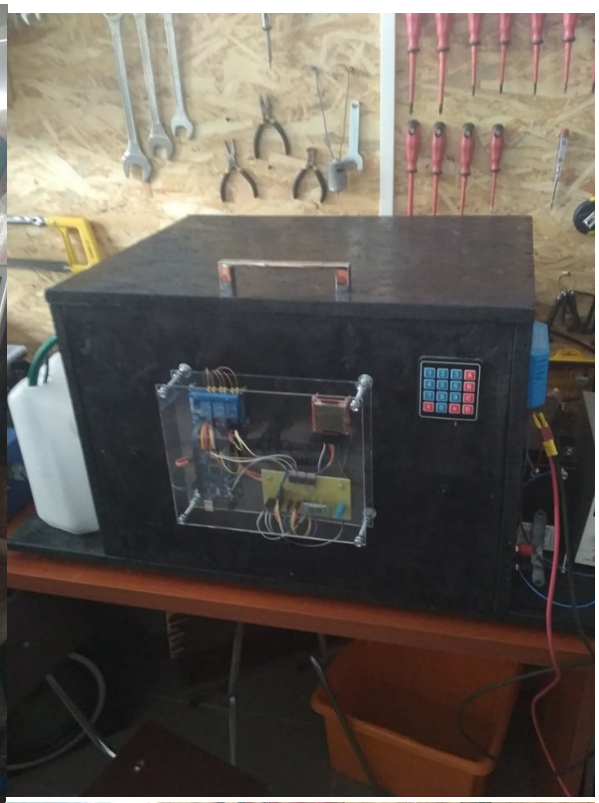
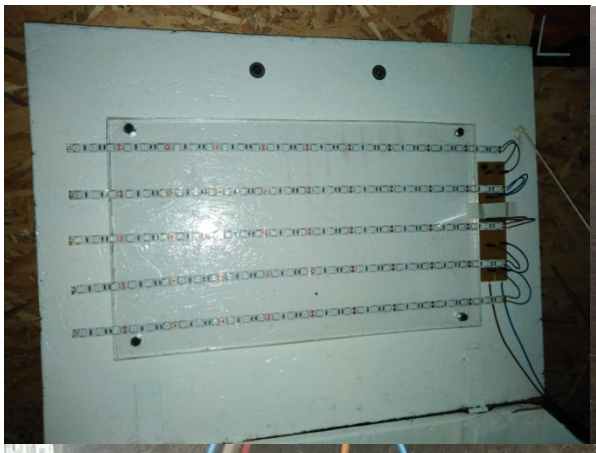
- Dawid Kwiatkowski,
- Jakub Łukowski

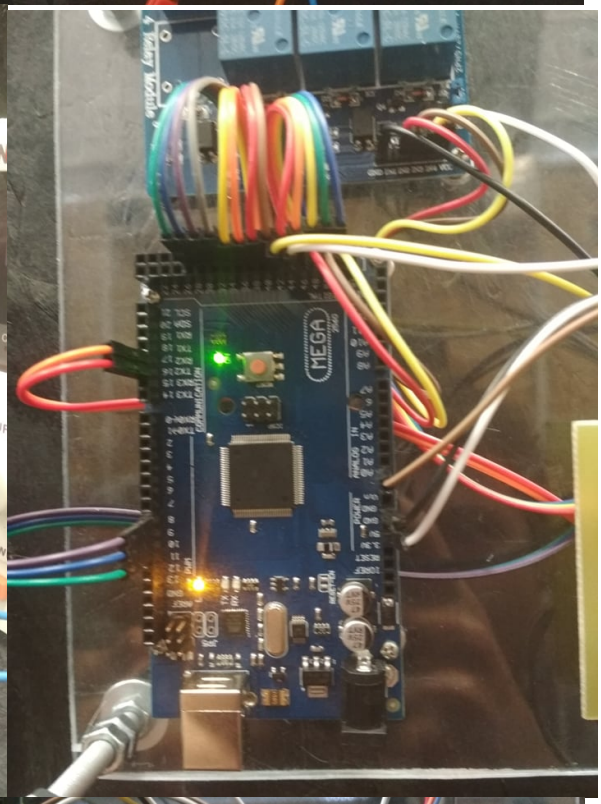
from class 3b of the Mechatronic Technical Secondary School at the Technical Schools Complex in Grudziadz.

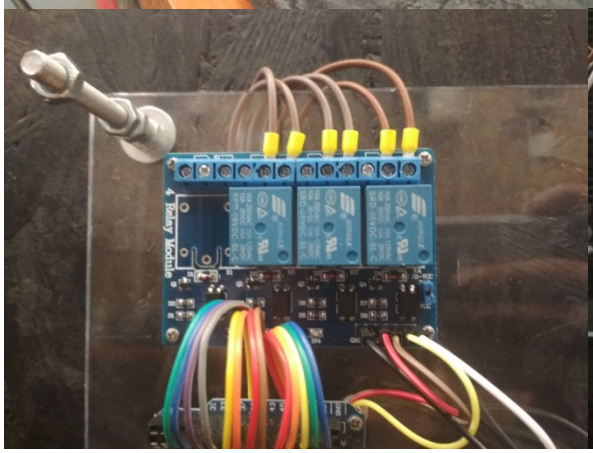
10. Photographs of #FloraHab

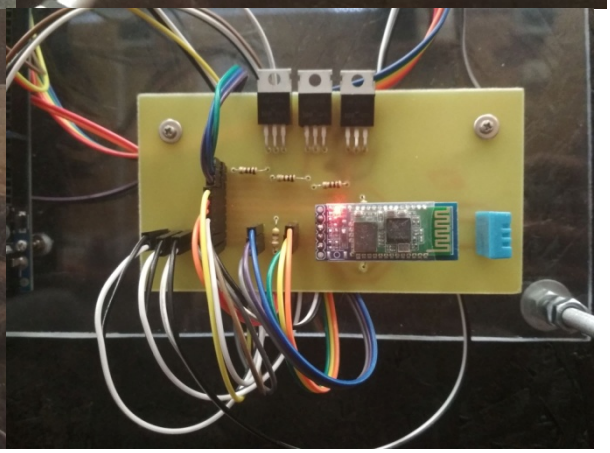






PV LOAD
LS1024EU
EPEVER
PWM Solar Charge Controller

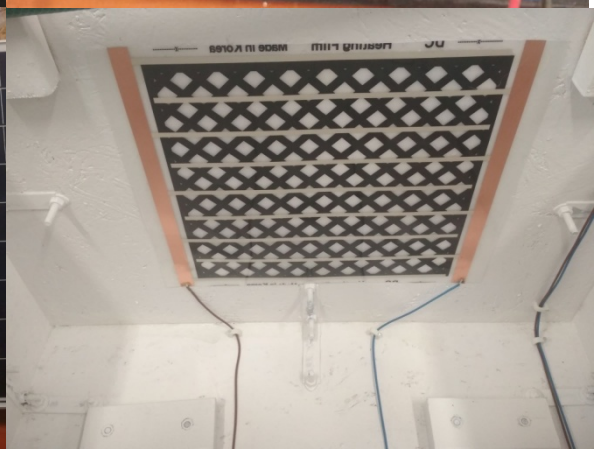

MEGA

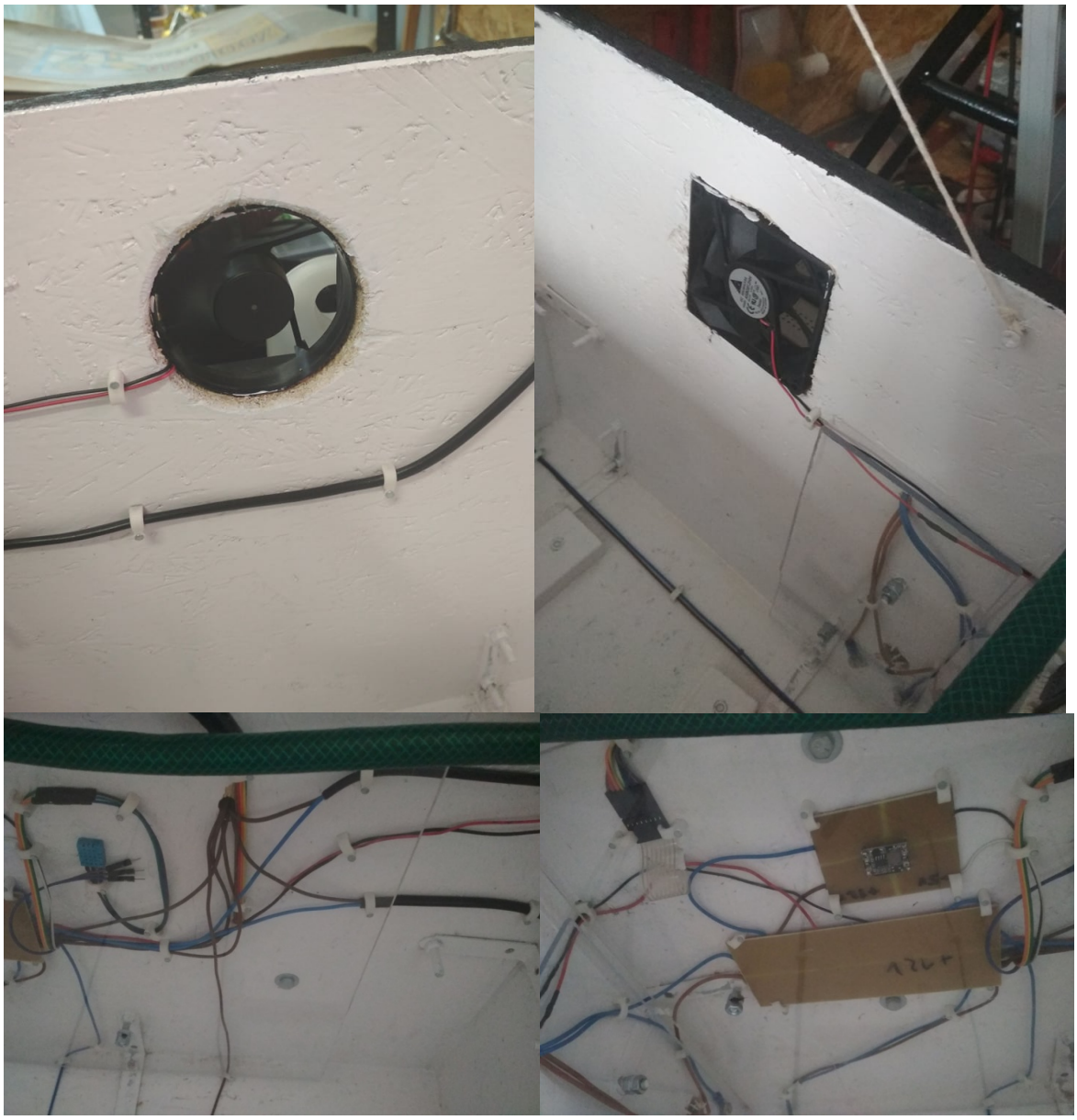


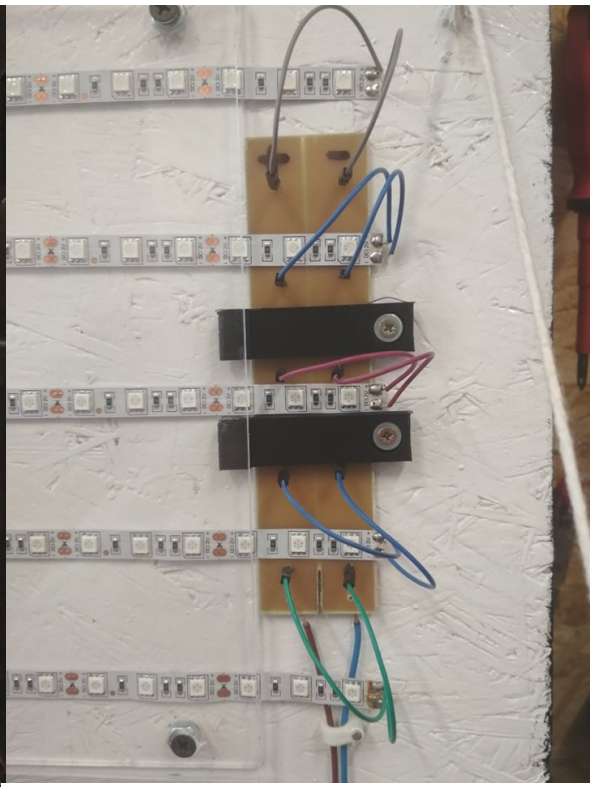


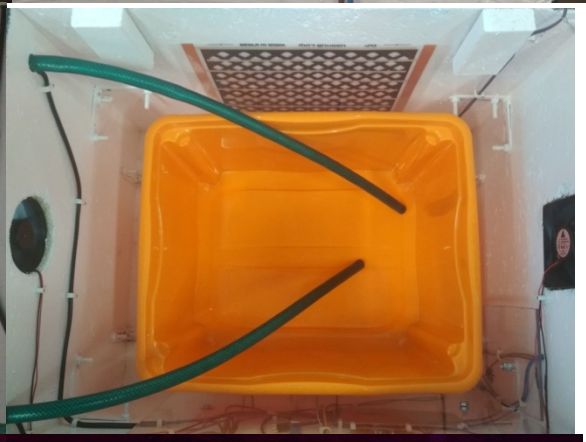
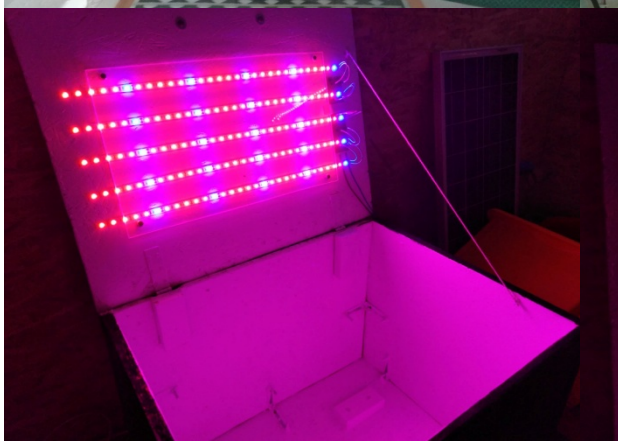
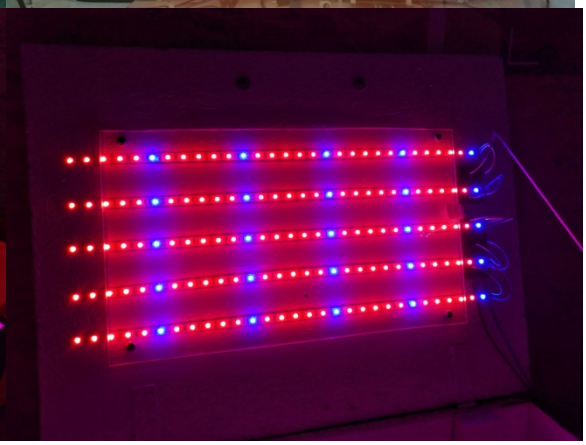

#floraHUB
A.Sensors
B.Heat mat
C.Regulation

1 2 3 A
4 5 6 B
7 8 9 C
* 0 # D





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