SEASON 2021

cathode

WORD ROBOT OLYMPIAD

open category

junior

The Future Advocates

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❖Introduction to the competition:

Since the industrial revolution people are using more and more energy that is provided by sources that come from fossil fuels. Our great-grandparents worked with oxen, but farmers in many areas are now using machines to work on the land. All the fabric for our clothes used to be woven by hand, but most fabric is now made using big weaving machines. And most of you can go to school by bus or car instead of having to walk. In some of our houses, we have also automated many things. Many families use a washing machine, a vacuum cleaner and have a shower with hot water. There have also been many inventions that we now use in our daily lives. Radio, television, computers, air conditioning, central heating and of course our mobile phones! In the last 150 years we have been using a lot of fossil fuels to make this possible. But many people now realize that we cannot do that forever. We need to use more clean and renewable energy. Renewable energy is energy that comes from sources that renew themselves, such as sunlight, wind, rain, tides, waves, and geothermal heat. But using renewable energy means that we need to solve new challenges. And that is where we ask you to help.

Robotics is a wonderful platform for learning 21st century skills. Solving robotic challenges encourages innovation and develops creativity and problem-solving skills. Because robotics crosses multiple curricular subjects. We learned and applied knowledge of science, technology, engineering, math, and computer programming.

The most rewarding part of designing robots is having fun. We worked together as a team and discovered our own solutions. Our Couch guided us along the way.

At the end of the day, at the end of a fair competition, we did our best, we learned, and we had fun.

❖Introduction to “The Future Advocates”:

Our project supports the energy of the future, which is clean energy that does not pollute the atmosphere, such as hydroelectric or geothermal energy, unlike coal and oil that pollute the atmosphere. The United Arab Emirates seeks to achieve a sustainable environment, to preserve the environment and guarantee a greener future for the future generations. This is due to the increasing demand for electricity and water in the country due to the increase in population.

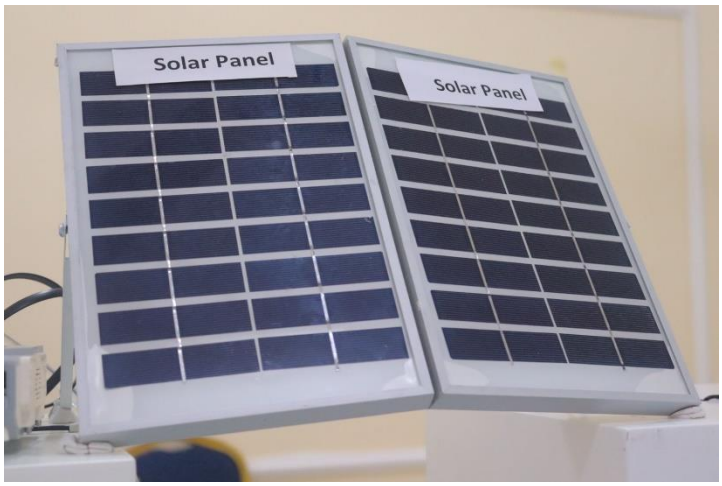
Clean energy has been given that name because it is considered energy free from harmful emissions, it is originally derived from the earth's natural resources, and is generated either by solar energy, wind or other renewable energy sources. we divide our project into three sections and the project consists of three sections that support clean energy so that the idea of the project “The Future Advocates” will reach you. And a small idea serves the country.(1)

Total project (1)

To create an overall comprehensive project for our team “The Future Advocates”, we decided to segregate the grid into three designated areas. The first one responsible of generating electric current from kinetic energy and solar power. The second one would be responsible for generating electrical current from hydroelectric power. The third and final section in the grid would be aimed to further increase the green efficiency of the whole grid by setting up a water electrolysis plant that aims use electrical current passed through water in order to break it to its components Hydrogen and Oxygen. These two elements can then be later used in other aspects that will serve the whole community. The hydrogen can be transferred to the power plant where it can be used in making hydrogen cells responsible for powering cars and other hydrogen-based projects along with the oxygen that shall be delivered to the hospitals nearby for the use of patients as it will be pure oxygen.

❖ First Section:

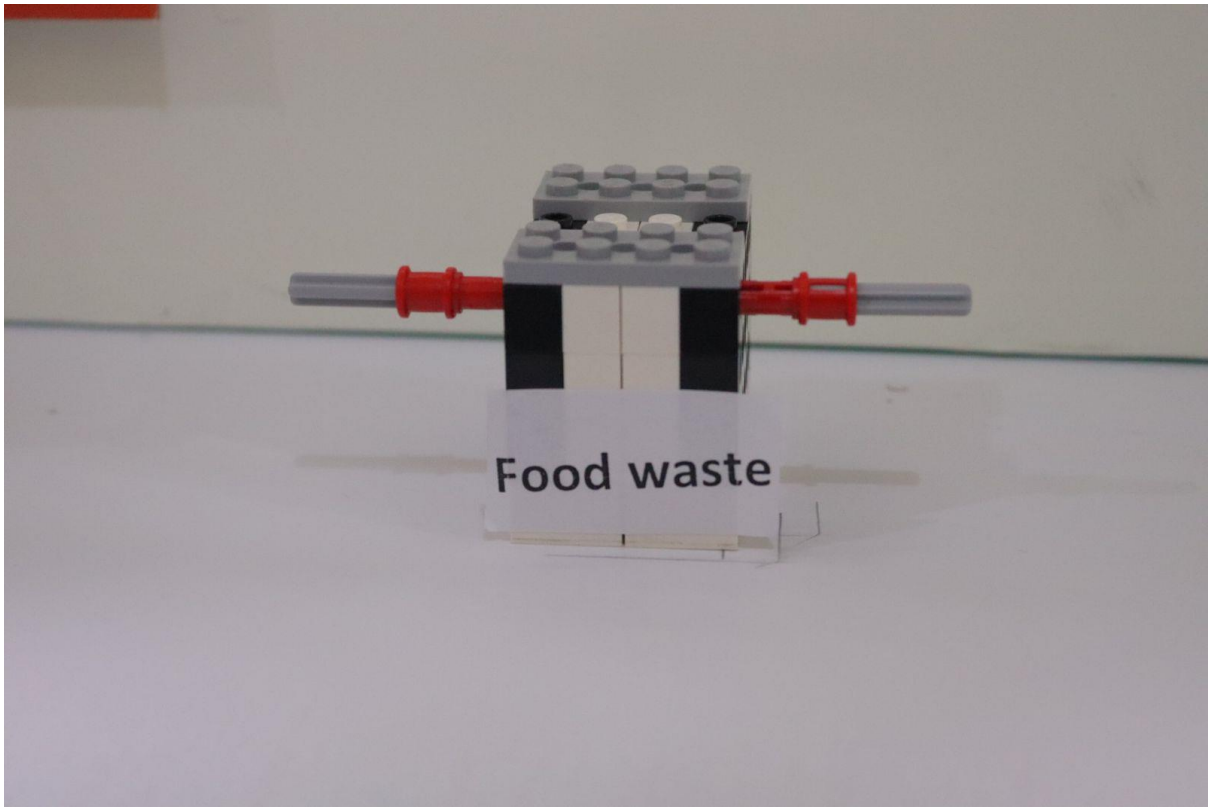
In the first section we have a house that made of wood with solar panels and the solar panels will convert sunlight into electrical energy because when the sun's rays hit, the photons in the sunlight allow some of the electrons, liberated and move toward the part without electrons. Creating an electric current. and the energy will be stored in the power station where generators are converted into clean energy, and we used a sensor that measures electrical consumption. (2)

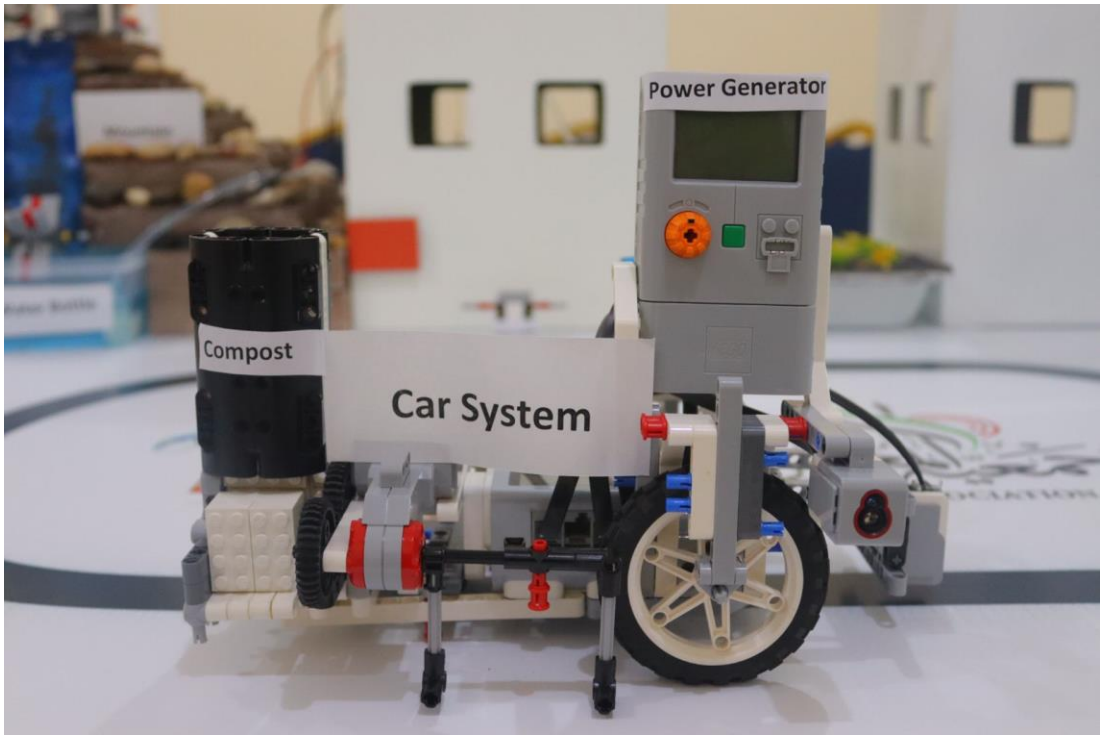


Solar system Power for house (2)

As we all know that is very important to have in front of every house a recycling bin. You might be wondering why is this important? It’s important because there will be a robot that’s made of ev3 Lego and it’s programmed by the Lego mind-storms app, that it will take the organic trash to the recycling building, and the food that’s in the trash will be recycled into compost. Most of us get rid of waste and food leftovers by placing them in the garbage, which we do not use at all. Not only that, but it also contains a sulfur oxide, which is known to affect the

respiratory system, affect the heart, cause asthma attacks, and problems that affect the immune and nervous system, which sometimes may cause cancer due to the presence of dioxin. The waste also contains decomposing garbage, which in turn works to produce methane, which causes global warming, and the robot will reward the owner of the house with compost, and from compost, the owner of the house can use it in farming or for his garden, because Food waste is characterized as a material rich in benefits and nutrients that we can add to the soil, so organic fertilizer can be easily produced from the ingredients in the kitchen, and this method is an effective way to preserve the environment and reduce the volume of waste by recycling it and making organic fertilizer with it.





Car system distribute compost and take waste food (3)

Compost is a component that is used to fertilize trees, fruits and vegetables. It is a medicine for soils that lack organic and nutritional materials. It is often produced from food residues, animal dung and tree leaves. It is an excellent and very healthy alternative to industrial compost. As well as the movement of the robot, we were able to convert it into electrical energy, because humans have tried to exploit kinetic energy by trying to invent various devices, and in the end, the invention of the electric generator was reached by the American scientist Mile Faraday in 1831 AD, which found the solution to many problems in the process of obtaining electrical energy. The electric generator is used to convert kinetic energy into electrical energy using mechanical energy resulting from kinetic energy from any source such as the energy of running water, and it produces a

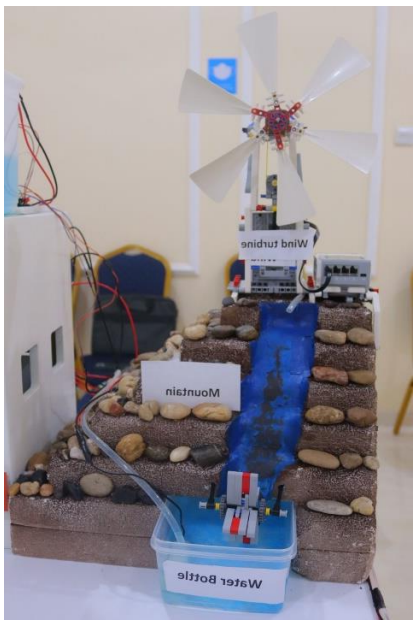
magnetic field due to the induction process in the main generator, which performs the main operation of generating current. The secondary part of the generator or the stator, which turns into an electric current, then this electric current is delivered with an external electric circuit to take advantage of this energy, and the amount of energy that can be obtained can be increased by increasing the kinetic energy, and the electric generator was used in many devices It can also be used as a separate device on its own.

We add on the bumps that are in the street direct piezoelectricity sensor so if a car or the robot drives on it will cause pressure because of the weight of the car or the robot and it will turn in to electrical energy and it will be stored in the power station, and when the robot finishes its task, it will go to the robot's parking where it will be charging by the solar panels that is located on the top of the robot parking so it could get sunlight from the sun.

All the above-mentioned ways have been implemented in order to maximize the efficiency of the whole process and adapt the whole grid to generate green energy. This was achieved by various sessions of brainstorming conducted in order to achieve maximum electrical output.

❖Second Section:

The second stage of the project compromises mainly of a water desalination plant that is responsible for taking in sea water and using electric motors that are powered by solar energy, are driven up the mountain for it to be desalinated. The desalination process is done using a wind turbine on top of the mountain to ensure that the entire project is done using green renewable energy. After the water is desalinated, the water rushing down the mountain in the designated streams is used to generate electricity using the turbines that are placed alongside both sides of the stream.



Wind System (5)

The turbines are responsible for generating current and transferring the electricity generated to the power plant where it can be stored for later usage

according to the needs of the city that are monitored using a robotic system that gives real time information.

Furthermore, the water after reaching the bottom of the stream shall be stored in water reserves for the houses, the houses requirements are also monitored using robotic systems and sensors that delivers water according to the needs of the houses.

Finally, a further addition to the system relies on the humidity sensors placed in agricultural fields that monitor the water level of the soil and upon reaching a required level of irrigation, the system automatically turns on the irrigation system from the water reserves.

❖Third Section:

In this section we are going to focus on electrolysis. Electrolysis is the process of splitting water (H2O) and separating its components into hydrogen and oxygen gases completely separated by applying electrical energy. The electrolyze usually consists of an anode (the positively charged electrode) and a cathode (the negatively charged electrode) separated by an electrolyte. hydrogen gas is an ideal source of energy and does not pollute the air when its burned.

Electrolysis System (6)

How did we make it?

First, we placed 6 aluminum sheets 3 to the left and 3 to the right. and then we chopped 2 big empty bottles and placed them over the aluminum sheets, then

using the plastic welding we made two holes for the bottle's caps and in the bottle caps we made other holes for the tubes,

and we wrapped a plastic bag around the tubes so the gases can be stored.

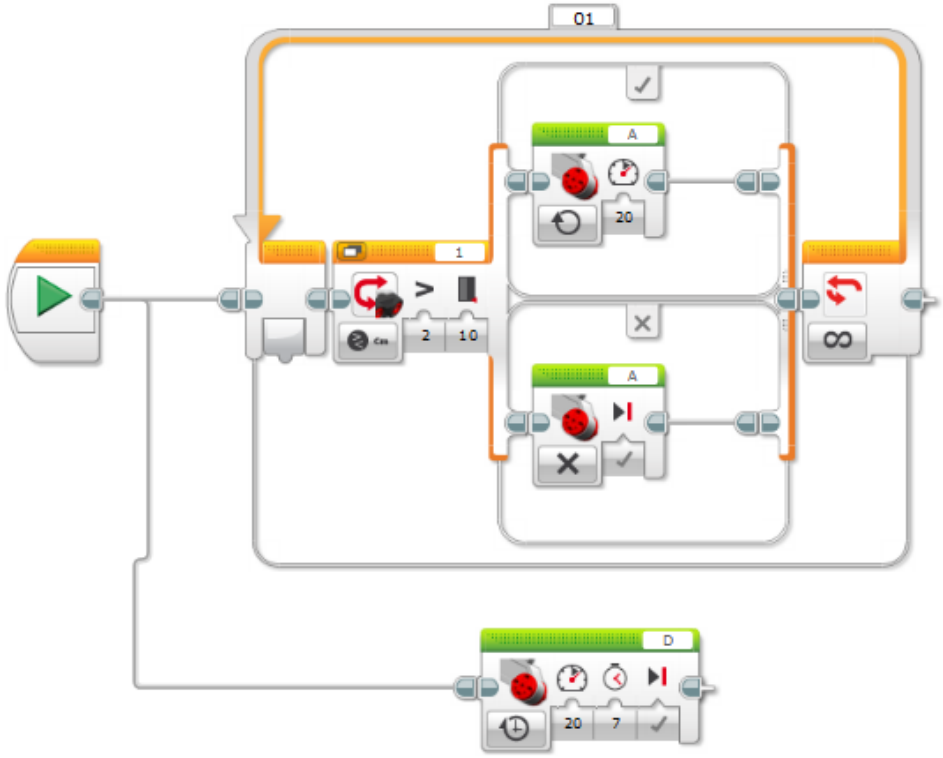
The Methodology

Aimed to further increase the green efficiency of the whole grid by setting up a water electrolysis plant that aims use electrical current passed through water in order to break it to its components Hydrogen and Oxygen. These two elements can then be later used in other aspects that will serve the whole community. The hydrogen can be transferred to the power plant where it can be used in making hydrogen cells responsible for powering cars and other hydrogen-based projects along with the oxygen that shall be delivered to the hospitals nearby for the use of patients as it will be pure oxygen.

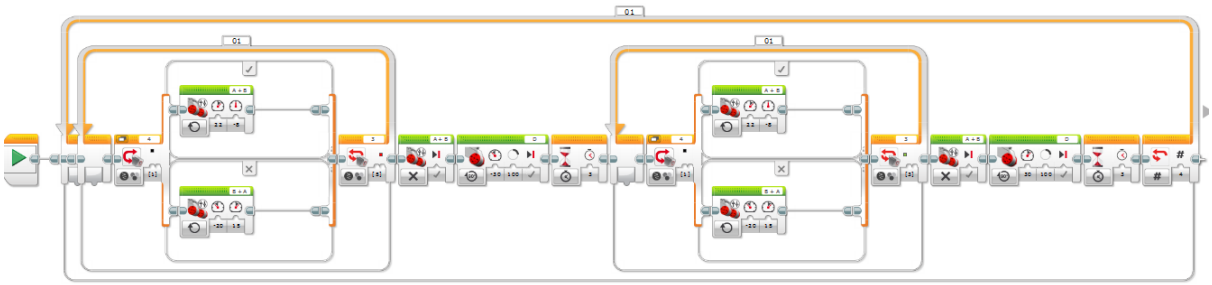
Power Station System (7)

Programming Snippets:

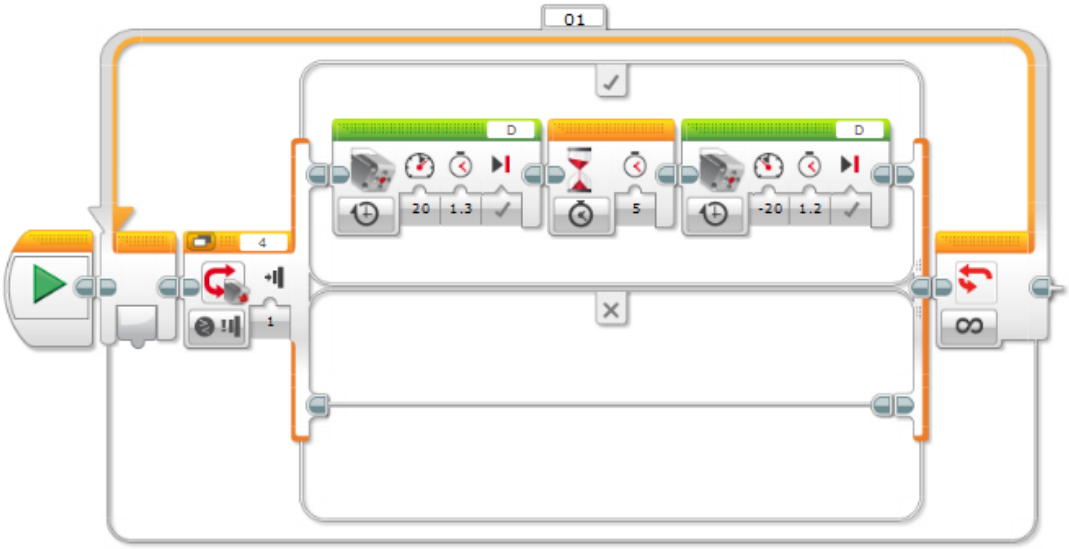
- **Farm program**



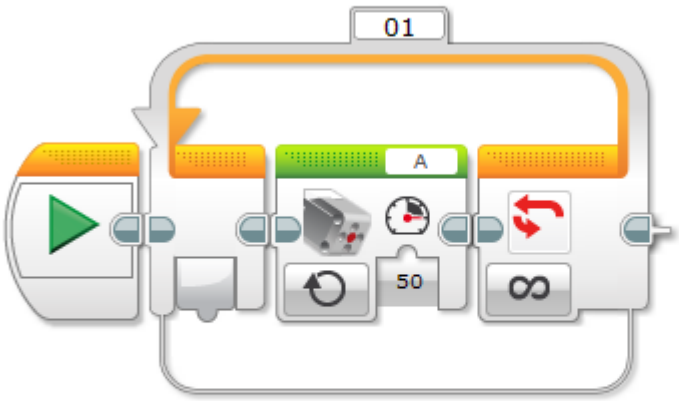
- **Car system**



- **Parking system**



- **Wind system**



❖Materials:

Martial Name	Count
House of wood	**2**
Ev3 Lego	**3 kit**
Acrylic panel	**1 size 122*160**
Water bottle	**3**
Tubes	
Foam	**1 piece**
Laptop	**2**
Paint	**Color**
Color paper	**2**
Weirs	**4 M**
Rocks	**2 bags**
Brown spray paint	**1**
Salt	**1**
Plastic container	**4**
Stainless steel electrode	**8 pieces**
Plastic bottle	**3**
plastics welding	**5**
Sticker paper	
Scissors	**2**
Ruler	**2**
Gun glue	**1**
Straw	**1**
Plastic plate	**1**
Plastic plants	**1**