Lattakia 2030

Ramita Team

WRO Syria 2017 - Open Category

Introduction

We are Ramita Team, Ramita has been the first name for lattakia city since Phoenician Civilization. and Ramita symbolizes the high place.

We want to simulate our vision for Latakia city in 2030 to be a smart city that uses the latest technology, green building methods, clean energy, data mining, image processing, visual reality, agreement reality, machine learning, computer vision and more advanced technology.

Our city is separated into two parts, sea part and city part with a mountain.

Who are we?

Nshteh Seropian (The Programmer)
13 years old, he started in Robotics from 4 years until now, He likes programing, coding and new technology field especially in Drones field. He allows things about AI for video game he play, and from here he loves programming.

Celine Abozrar (Our Superwoman in the team) - 12 Years
Even she is the only girl in the team, she loves looking for new ideas and search about it, she's our researcher in the team. And she is our leader and the engine for our team. She played robotics for 4 years.

Karim AL-Assad (The Team's Engineer) - 12 Years
Whatever the project and idea you want to build, you can not find a better engineer to build for you better than Karim, with his great skills in mechanisms that were responsible to build almost 23 robots and prototype for this project only. He played robotics for 4 years until now.

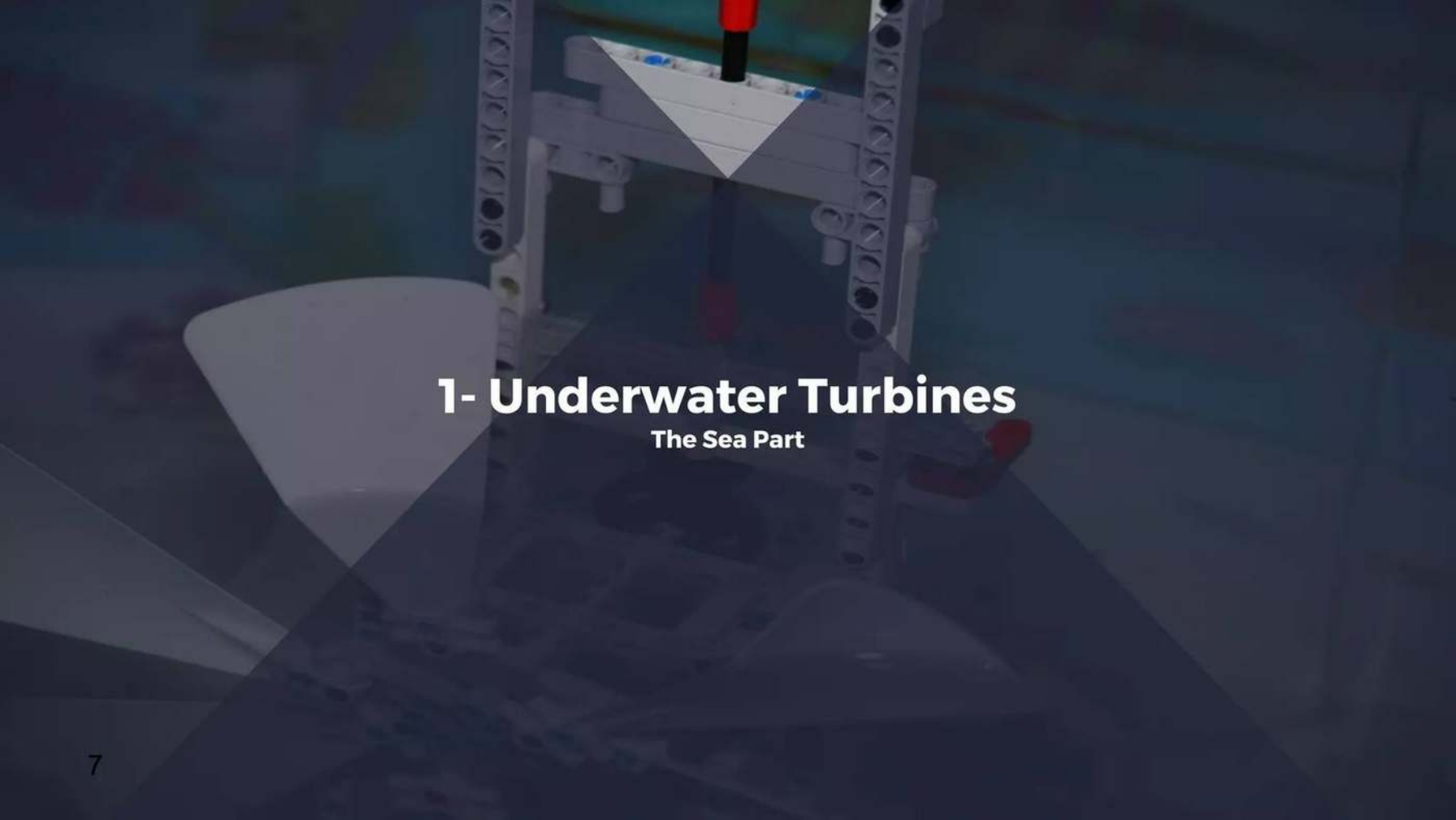
How we chose this idea?

The mission this year is to build a robot that makes your region more sustainable in one of the following four goals: Affordable and Clean Energy, Sustainable Cities and Communities, Climate Action, Life on Land

We chose to focus on Sustainable Cities and Communities especially for our country with a re-building and Early recovery for most cities in Syria after the 6 years of war.
We are looking forward to build Syria in the way we want to see it in further and Lattakia city it's the best place to start it with great sea the nature and the place is important and ancient history and culture.

Our city is separated into two parts:
The sea part
The city part with a mountain

Sea Part



1- Underwater Turbines

The Sea Part

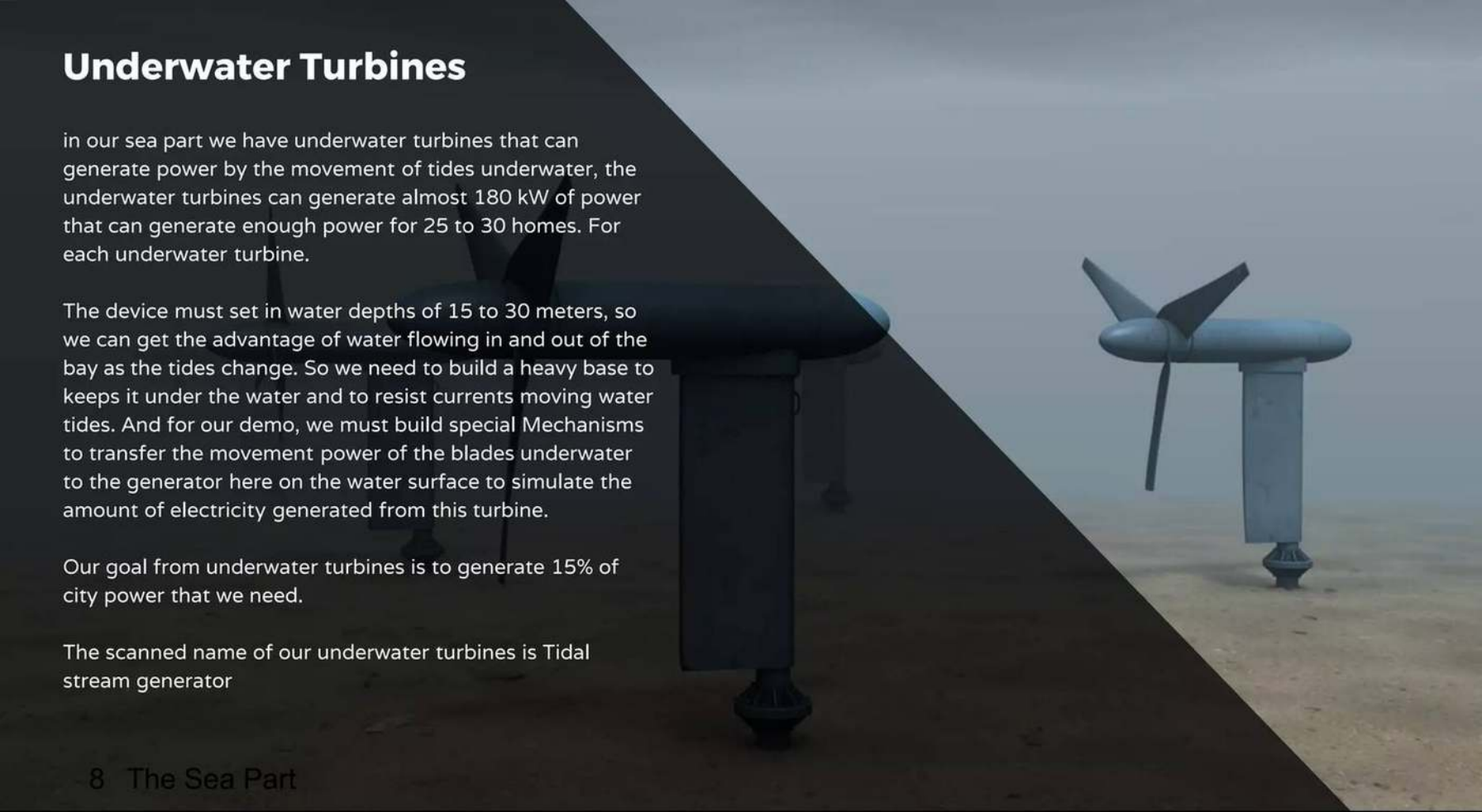
Underwater Turbines

in our sea part we have underwater turbines that can generate power by the movement of tides underwater, the underwater turbines can generate almost 180 kW of power that can generate enough power for 25 to 30 homes. For each underwater turbine.

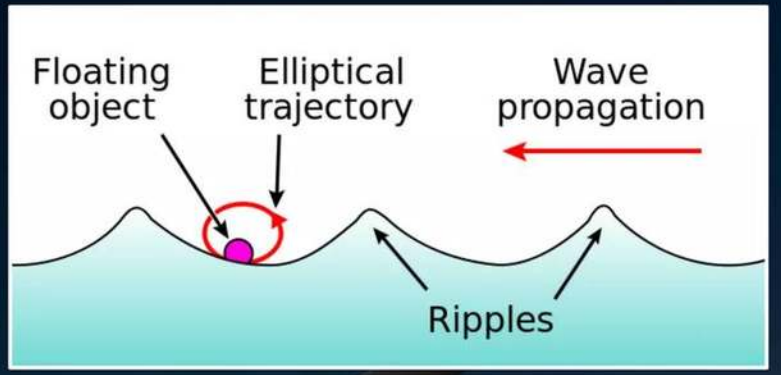
The device must set in water depths of 15 to 30 meters, so we can get the advantage of water flowing in and out of the bay as the tides change. So we need to build a heavy base to keeps it under the water and to resist currents moving water tides. And for our demo, we must build special Mechanisms to transfer the movement power of the blades underwater to the generator here on the water surface to simulate the amount of electricity generated from this turbine.

Our goal from underwater turbines is to generate 15% of city power that we need.

The scanned name of our underwater turbines is Tidal stream generator



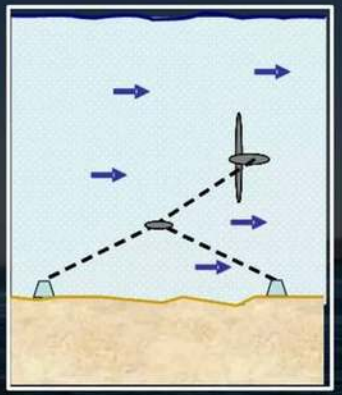
Underwater Turbines



In deep water where the water depth is larger than half the wavelength, the wave energy flux is[a]

$$P \approx 0.5 \frac{\mathrm{kW}}{\mathrm{m}^3 \cdot \mathrm{s}} (3 \cdot \mathrm{m})^2 (8 \cdot \mathrm{s}) \approx 36 \frac{\mathrm{kW}}{\mathrm{m}},$$

with P the wave energy flux per unit of wave-crest length, Hm0 the significant wave height, Te the wave energy period, ρ the water density and g the acceleration by gravity. The above formula states that wave power is proportional to the wave energy period and to the square of the wave height.When the significant wave height is given in metres, and the wave period in seconds, the result is the wave power in kilowatts (kW) per metre of wavefront length.



Example: Consider moderate ocean swells, in deep water, a few km off a coastline, with a wave height of 3 m and a wave energy period of 8 seconds. Using the formula to solve for power, we get

$$P = \frac{\rho g^2}{64\pi} H_{m0}^2 T_e \approx \left(0.5 \frac{\mathrm{kW}}{\mathrm{m}^3 \cdot \mathrm{s}}\right) H_{m0}^2 T_e,$$

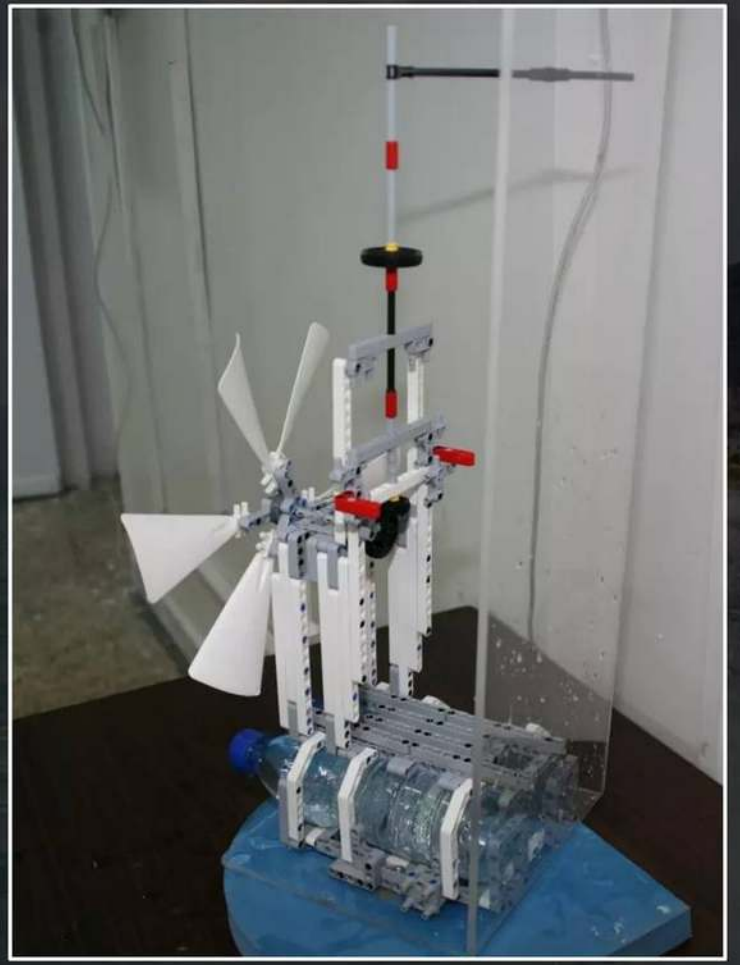
meaning there are 36 kilowatts of power potential per meter of wave crest.
In major storms, the largest waves offshore are about 15 meters high and have a period of about 15 seconds. According to the above formula, such waves carry about 1.7 MW of power across each metre of wavefront. An effective wave power device captures as much as possible of the wave energy flux. As a result, the waves will be of lower height in the region behind the wave power device.

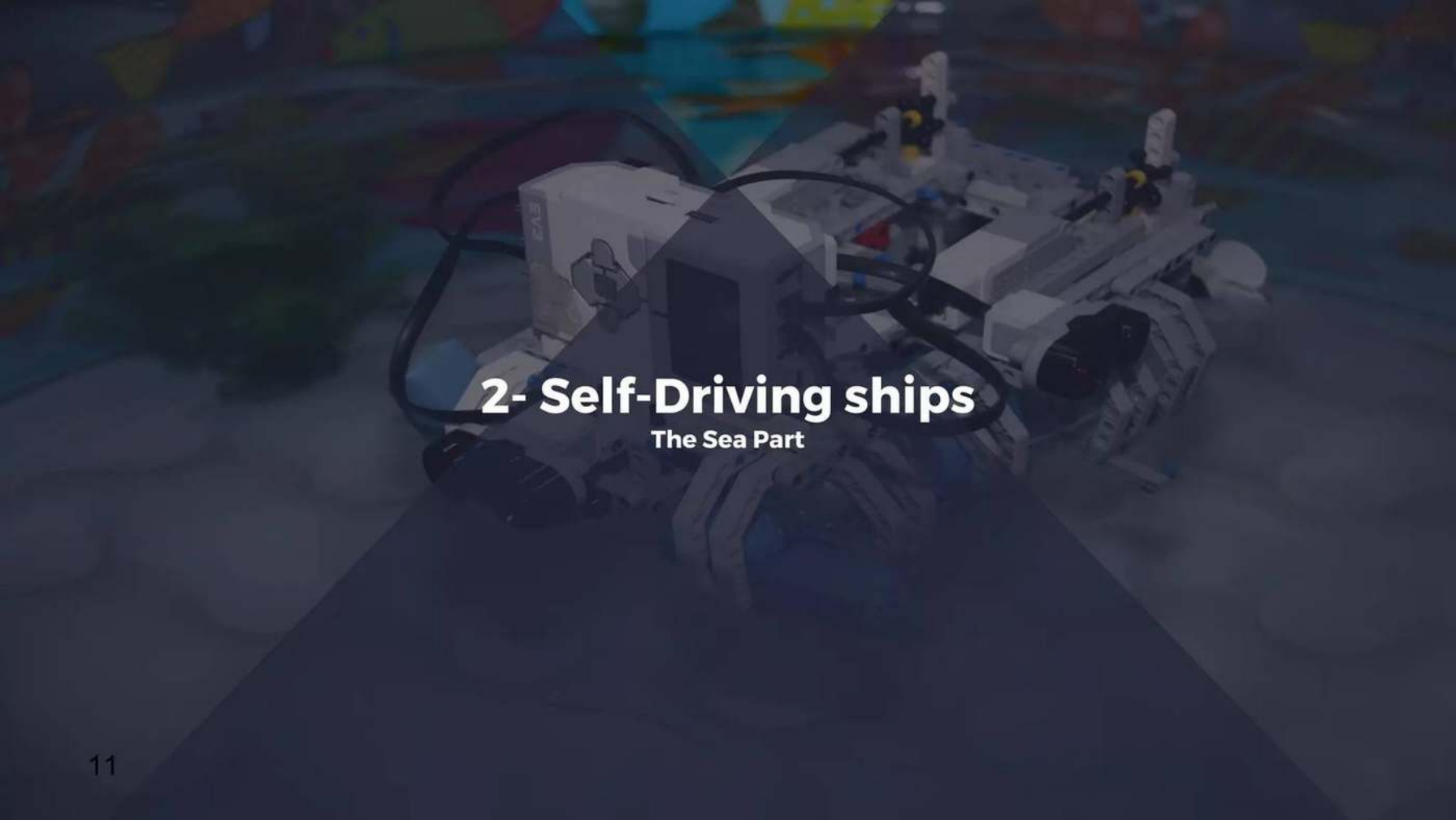
We build our underwater turbine using LEGO part, and LEGO Blades. We use 6 Blades because the torque underwater it's so huge and so much the water it's touching the surface of blades musch moving we get.

We add a heavy base to keep our underwater turabin stable in it's place the floor of the sea, in our case it's our swimming pool.

We build special mechanisms using LEGO Gear system to Convert and transform the power and moving of blades to up Surface of water because our Generator -in our simulation is the LEGO Large Motor- to keep the motor save and not demag from the water.

We program the underwater turabin using LEGO Mindstorm virtual Programing Language so we can strimming how much power moving the motor are work and from there we can express how much power in real live this underwater turabin can gentreat.





2- Self-Driving ships

The Sea Part

Self-Driving ships

Our Second robot will be this ship, it's a self-driven ship, that can detect its location by GPS and Marine radars that are X band or S band. Radar is a vital component for safety at sea and near the shore. Captains need to be able to maneuver their ships within feet in the worst of conditions like navigating "blind". Meaning safely navigating their way through waters even inside a dark room with no visibility.

Also, the ship contains ultrasonic sensors for sensing the nearby physical barriers that may be encountered by the ship like islands or other ships or obstacles. By using the GPS system and Marine radars the exact place of the ship is known and a new target (place) is set, and the ship can go from A place to B target place.

The new zero-emission vessel will be a game-changer for global maritime transport contributing to meet the UN sustainability goals the ship will feature batteries as a major power source. On the inside, the ship features technology similar to current self-driving cars. The ship will use Lidar, cameras, radars and other physical sensors to power its autonomous functions.

Self-Driving ships

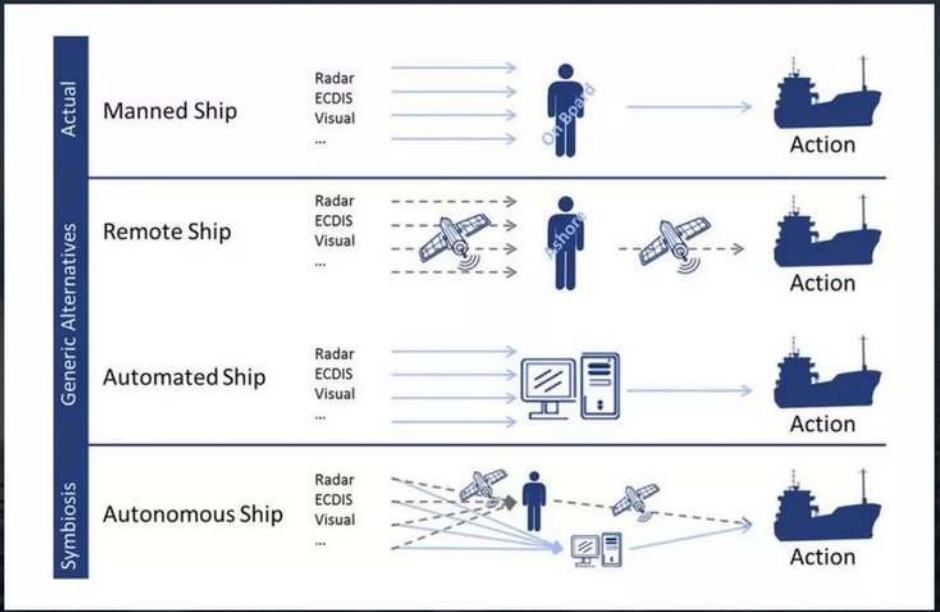
Autonomous vehicles are already state-of-the-art in many land based transport modes. There exist several examples of automated subways, self-driving intralogistics vehicles or automated guided vehicles (AGV) on modern container terminals. There are also very wide-ranging approaches of autonomous control concepts in modern aviation.

Consequently, autonomy is also seen as a possibility for maritime transport to meet today's and tomorrow's competitiveness, safety and sustainability challenges.

This description implies two generic alternatives that are combined in an autonomous ship (see also figure):

- the remote ship where the tasks of operating the ship are performed via a remote control mechanism e.g. by a shore based human operator and

- the automated ship where advanced decision support systems on board undertake all the operational decisions independently without intervention of a human operator.

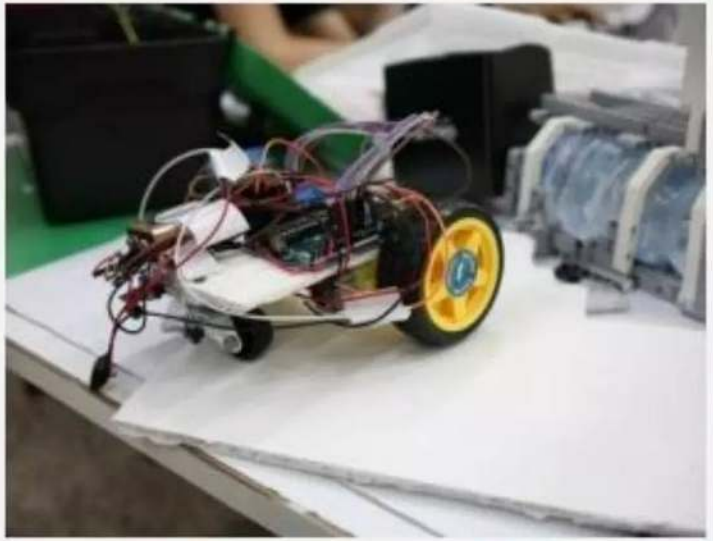


Our big part for our 13 Robots that we have in our projects it's this ship. It's took a lot of testing and prototype to came up with version, and there is no need to tell about how much it's so hard and challenged to work and LEGO controller and motor and sensor in water environment because all of this part are not water proves. And High weight are.

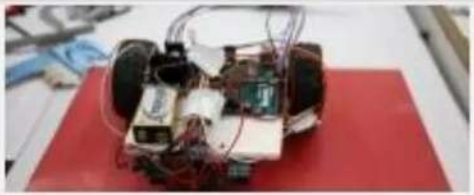
We build our ship using 90% LEGO part expect the recycled plastic bottle and swimming training Surface so it's can help hold the High weight, and build a room and space for this material using LEGO part it's showing in pictures. We add two LEGO medium motor for the less weight and more speed we have it from LEGO Large Motor, and we add custom build for our ship a 3D printing Blades for make a right move for this ship, and this Blades are so special because it's was printed in Homs City - Syria and it's printed it's our loved city homs it's make it so special for our project.

Sure we keep in our mind in building this ship it's to stay safe from water and not to sink in moving, we do not want to Damage and 800$ robotics kit for that.

Ths ship it's auto driving, but for limitation for the tools and Sensors we have it. We make our Self-driving ship work using UltraSonic Sensors. So the close one for nerable objects the ship will go far from it.




ShapeCollage.com

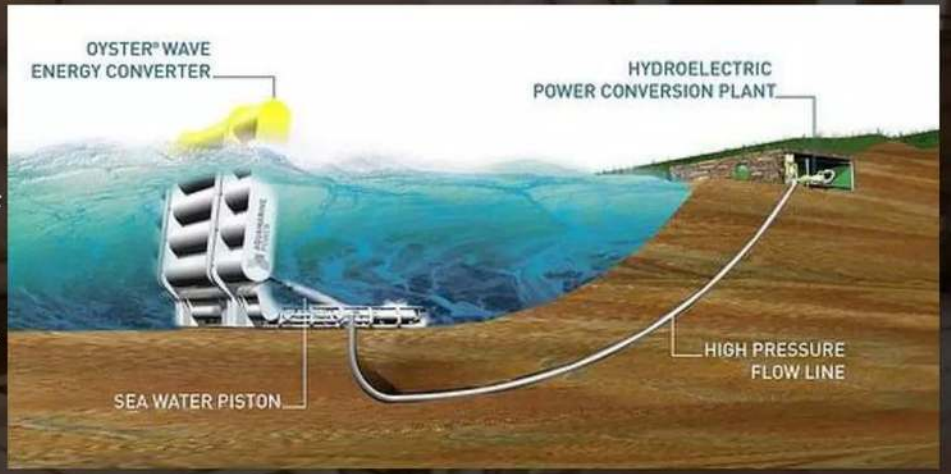


3- Wave Generating Arms

The Sea Part

Wave Generating Arms

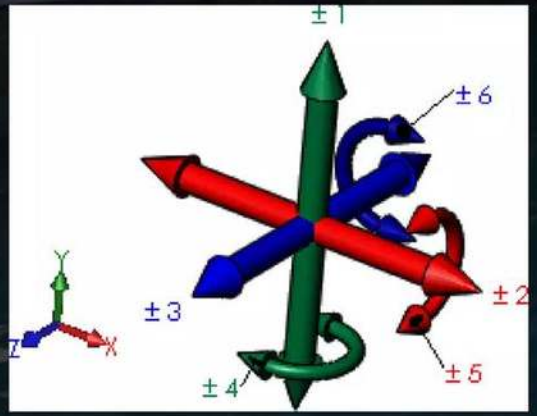
Our theid robot is a hydro-electric wave energy device that uses the motion of sea waves to generate electricity. It is made up of a Power Connector Frame (PCF), which is bolted to the seabed, and a Power Capture Unit (PCU). The PCU is a hinged buoyant flap that moves back and forth with movement of the waves. The movement of the flap drives two hydraulic pistons that feed high-pressured water to an onshore hydro-electric turbine, which drives a generator to make electricity.

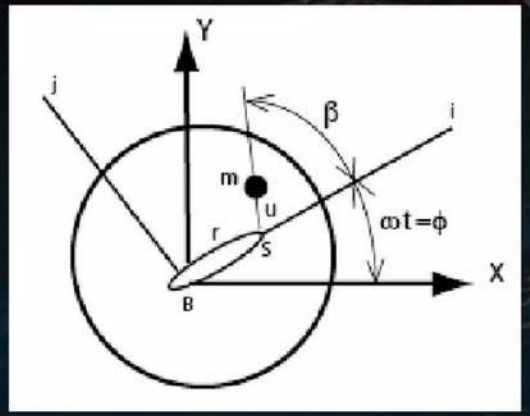


harnesses the energy of near-shore ocean waves; it was designed to operate in water 10 to 12 metres deep. The Oyster is made up of a Power Connector Frame (PCF) and a Power Capture Unit (PCU). The PCF requires careful and accurate positioning and leveling to compensate for the uneven, rocky seabed. In order to lower the PCU into the water to hinge it to the PCF, 120 tons of seawater must be pumped into ballast tanks within the PCU to provide sufficient negative buoyancy to aid its descent into the water. The PCU is almost entirely submerged underwater; only 2 metres of the device poke above the water. The PCU sways back and forth with the movement of the waves, and this movement of the flap drives two hydraulic pistons that pump high-pressured water through three sub-sea pipeline to an onshore hydro-electric water turbine. The turbine then drives a 315 kW electrical generator, which converts the wave energy into electricity.

Wave Generating Arms

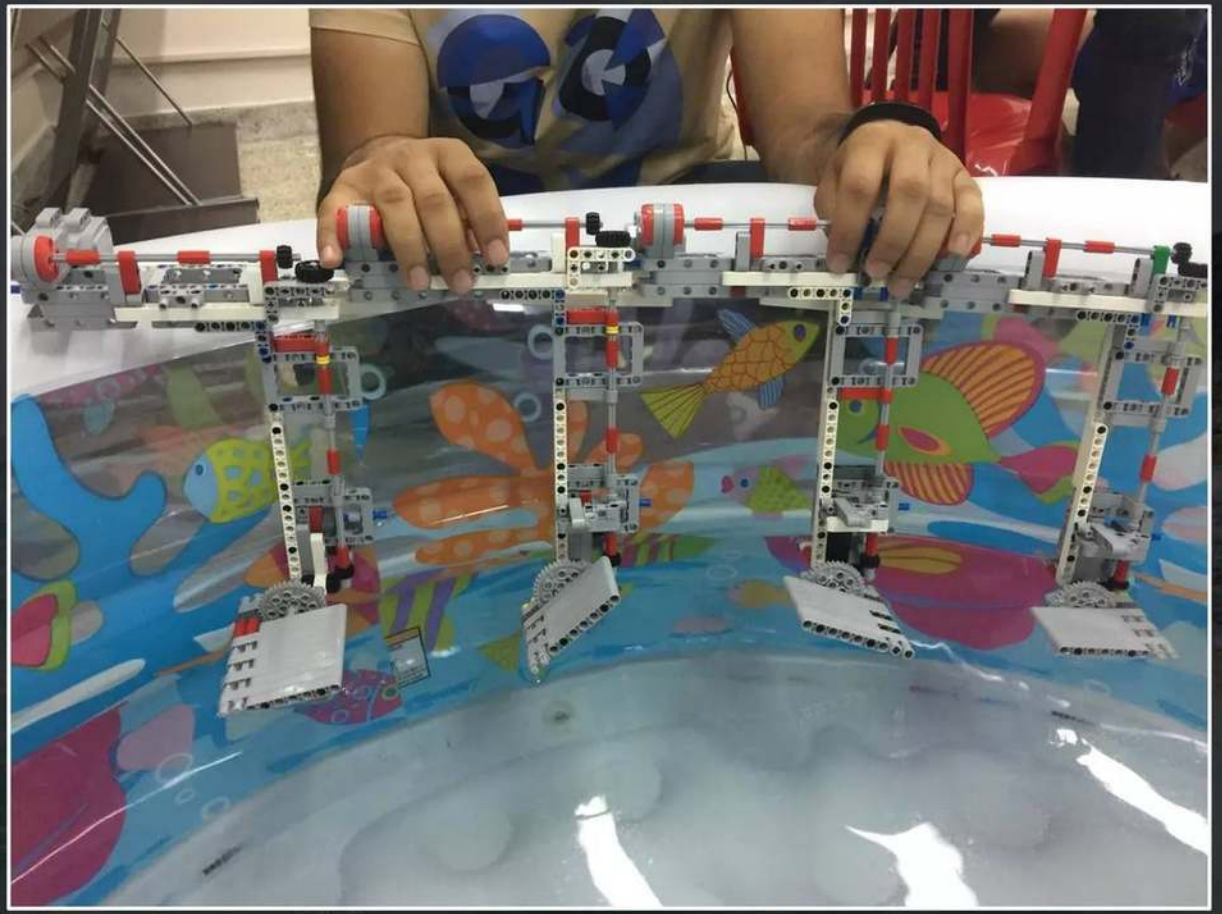
We want to use our robot to make another important Things for our simulation in the sea part, a LEGO robot with 4 arms moving in a circular way at One degree of Freedom (X,Y,Z) to generate and simulate waves in our sea putting into consideration mechanisms of safety and different modes of speed for the motors.





we really want a to make a realistic simulation, because for that we must simulate the wave moving in water and in same time to work as electricity generator so build this robot with 4 lego aram that moving in one degree of freedom to make wave in our swimming pool.

as always working in water with lego part and motor it's so hard to keep our part save and not damage from water, to achieve that we make a special table the attaching all the swimming pool and using this table we can hang and hold our robot far from the water.







4- Remote Submarine

The Sea Part

Remote Submarine

The ship works at the same time with the self-driving submarine this submarine can be controlled by a remote controller and it can take photos by the camera that is placed on it, and there are sensors that can measure the temperature and humidity of the water,and the depth, and it's can scan the sea floor and topographies of it using method name it Basins:
Bathymetry is the mapping and study of the topography of the ocean floor. Methods used for measuring the depth of the sea include single or multi-beam echo sounders, laser airborne depth sounders and the calculation of depths from satellite remote sensing data. This information is used for determining the routes of undersea cables and pipelines, for choosing suitable locations for siting oil rigs and offshore wind turbines and for identifying possible new fisheries.

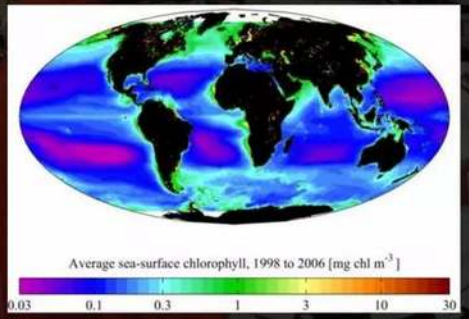
The Sea and oceans, in general, are home to a diverse collection of life forms that use it as a habitat. Since sunlight illuminates only the upper layers, the major part of the ocean exists in permanent darkness. As the different depth and temperature zones each provide habitat for a unique set of species, the marine environment as a whole encompasses an immense diversity of life.

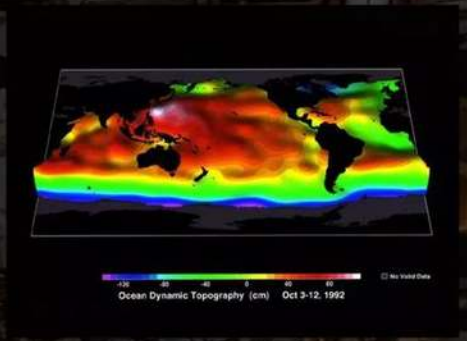
And to study this kind of habit, Algae, plants Animals and other life we put a camera and we will use the image processing with machine learning to Determines the life underwater the see, to know more about this life under the sea and at the same time to keep tracking and counting for this fish

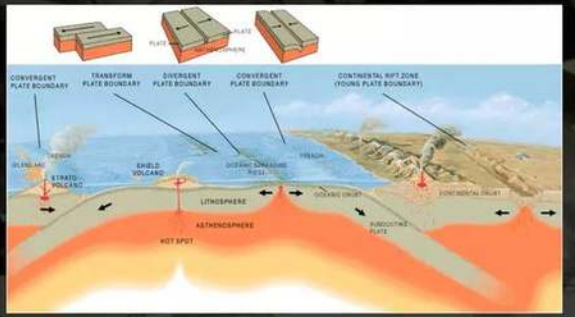
All this data it's will be essential to know more about our see so we can Protection of natural marine life in terms of topography, plant, and animal. Knowing the areas of pollution, development of marine life, identification of fishing times For fishermen or not. Develop smart fishery and other things that we can use this information and data for it.

Remote Submarine

The main misson of this submarine is to collect data on:

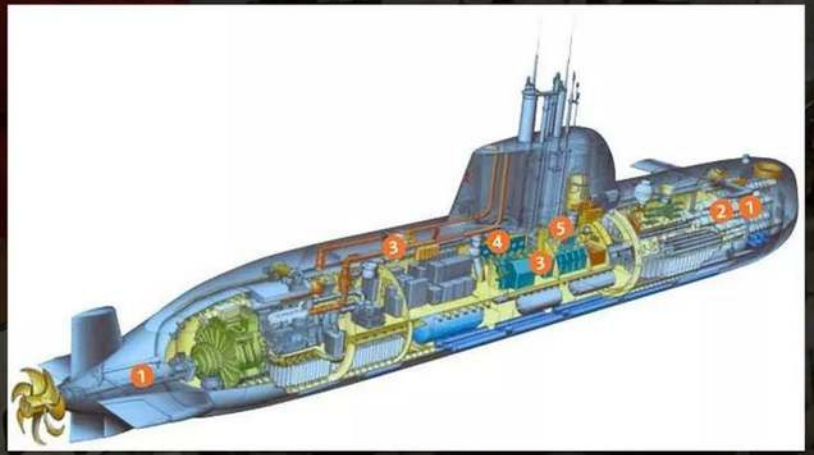


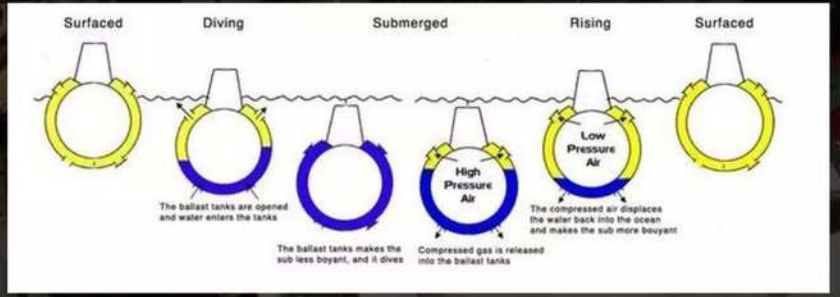




Remote Submarine

A submarine (or simply sub) is a watercraft capable of independent operation underwater. It differs from a submersible, which has more limited underwater capability. The term most commonly refers to a large, crewed vessel. It is also sometimes used historically or colloquially to refer to remotely operated vehicles and robots, as well as medium-sized or smaller vessels, such as the midget submarine and the wet sub. The noun submarine evolved as a shortened form of submarine boat; by naval tradition, submarines are usually referred to as "boats" rather than as "ships", regardless of their size (boat is usually reserved for seagoing vessels of relatively small size).





Our last part in sea part in our submarine, this submarine we try in first place to build it using LEGO part, and it's almost take about 3 months of testing and building prototype for it, but unfortunately every of our try are failed to so many Reasons the height width of our robot, the slow speed of motor and to keep LEGO EV3 Brick save form waterproof inside the water, make this mission it's impossible with the tools we have it in those days.

But we came with another solution, We buy from Amazon US a very special summering, that work in Remote Control using the 2.4Mkh Frequency so as theory we can hack their Frequency and build our own control and it's should our Arduino, but ordering this pampering from outside Syria it's take a lot of time, so we can We can not work on this point.

Our submarines have 3 motor, 2 of this motor are responded to moving background, forward ,left and right, and third motor is reposed to move the sumerian upper or dowing to the water.

Our submarines have a built in, waterproof camera that can tack pictures and video form the water directly.

For our muchsing learinerg part, we depend and use google cloud vision serveris, this serves allow for us to send picture or video to google servers and get back with a label and types of this pichers this kind of serving we want to use it in our smart city.

City Part

1- Smart City

The City Part

what is a smart city

the smart city really functions like the human body we have all the buildings in there were activities take place like the muscles in our body we have greenery and paths like our lungs they help to cleanse the air for us and give us oxygen to breathe and we have all the roads just like the veins and arteries in our bodies that move the traffic the people and the goods and you know our body has the five senses and the senses Center our brain it senses what happens in the environment and tells our brain how to get the body to adapt whether it's hot or it's cold so if you add a sensor layer onto our city it collects data and insights from this data can help the city to continue to learn and to adapt and from this we can develop smart applications for day-to-day living

1- Green Building

The City Part

Green Building

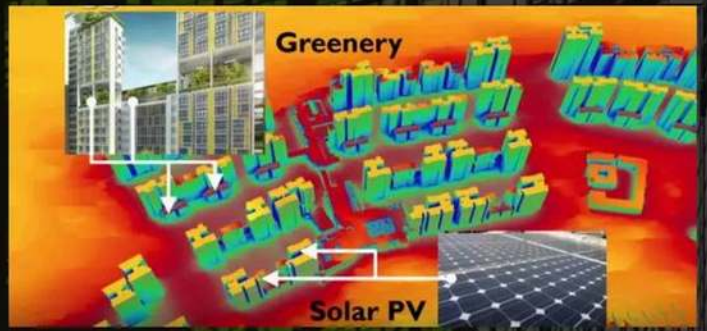
Let's start talking about our building, we use and depend in our building for our future city that In green building method, and green building Green building (also known as green construction or sustainable building) refers to both a structure and the application of processes that are environmentally responsible and resource-efficient throughout a building's life-cycle: from planning to design, construction, operation, maintenance, renovation, and demolition. This requires close cooperation of the contractor, the architects, the engineers, and the client at all project stages. The Green Building practice expands and complements the classical building design concerns of economy, utility, durability, and comfort.

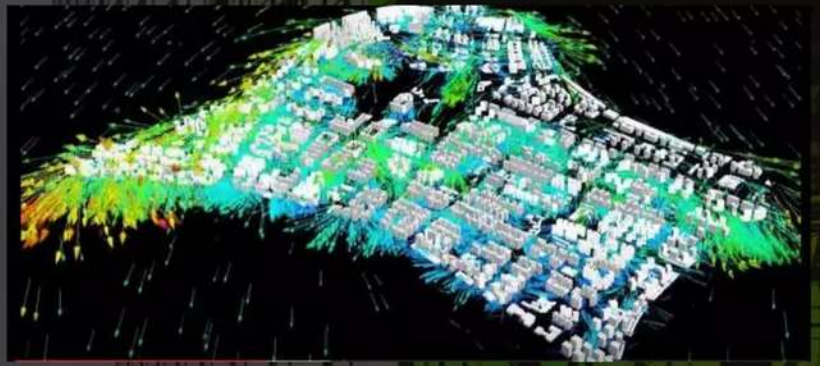
Globally buildings are responsible for a huge share of energy, electricity, water and materials consumption. The building sector has the greatest potential to deliver significant cuts in emissions at little or no cost. Buildings account for 18% of global emissions today, or the equivalent of 9 billion tonnes of CO2 annually. If new technologies in construction are not adopted during this time of rapid growth, emissions could double by 2050, according to the United Nations Environment Program

Green Building

The International Energy Agency released a publication that estimated that existing buildings are responsible for more than 40% of the world's total primary energy consumption and for 24% of global carbon dioxide emissions

Leadership in Energy and Environmental Design (LEED) is a set of rating systems for the design, construction, operation, and maintenance of green buildings which was Developed by the U.S. Green Building Council.





For this part we travel to Lebanon, Bertie to made a meeting with Nabhn Group Company, this Company it's one of big company in MENA reading for building construction and they have a lot of projects in Downtown Beirut, and in GCC country.

Our meeting who make sure it's was lead with Celei (our superwoman in team) to explain our vision and what we looking forward what lattakia city should looking in 2030.

We ask them to work together to build the view and Environment view for our robot in our simulation city in the Dimensions both 2x2m we have.

2- Smart Solar Panels

The City Part

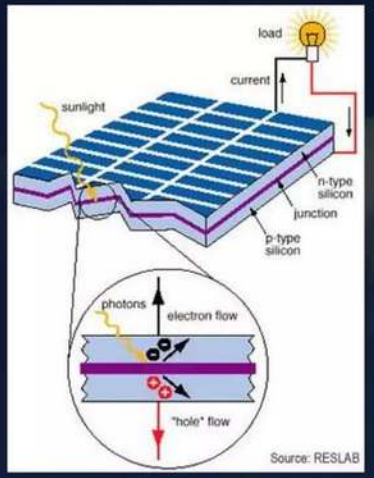
Solar panel

Solar panels absorb the sunlight as a source of energy to generate electricity or heat.

A photovoltaic (PV) module is a packaged, connect assembly of typically 6x10 photovoltaic solar cells. Photovoltaic modules constitute the photovoltaic array of a photovoltaic system that generates and supplies solar electricity in commercial and residential applications. Each module is rated by its DC output power under standard test conditions (STC), and typically ranges from 100 to 365 Watts (W). The efficiency of a module determines the area of a module given the same rated output – an 8% efficient 230 W module will have twice the area of a 16% efficient 230 W module. There are a few commercially available solar modules that exceed efficiency of 22% and reportedly also exceeding 24%. A single solar module can produce only a limited amount of power; most installations contain multiple modules. A photovoltaic system typically includes an array of photovoltaic modules, an inverter, a battery pack for storage, interconnection wiring, and optionally a solar tracking mechanism.

Smart solar modules

Several companies have begun embedding electronics into PV modules. This enables performing maximum power point tracking (MPPT) for each module individually, and the measurement of performance data for monitoring and fault detection at module level. Some of these solutions make use of power optimizers, a DC-to-DC converter technology developed to maximize the power harvested from solar photovoltaic systems. As of about 2010, such electronics can also compensate for shading effects, wherein a shadow falling across a section of a module causes the electrical output of one or more strings of cells in the module to fall to zero, but not having the output of the entire module fall to zero.

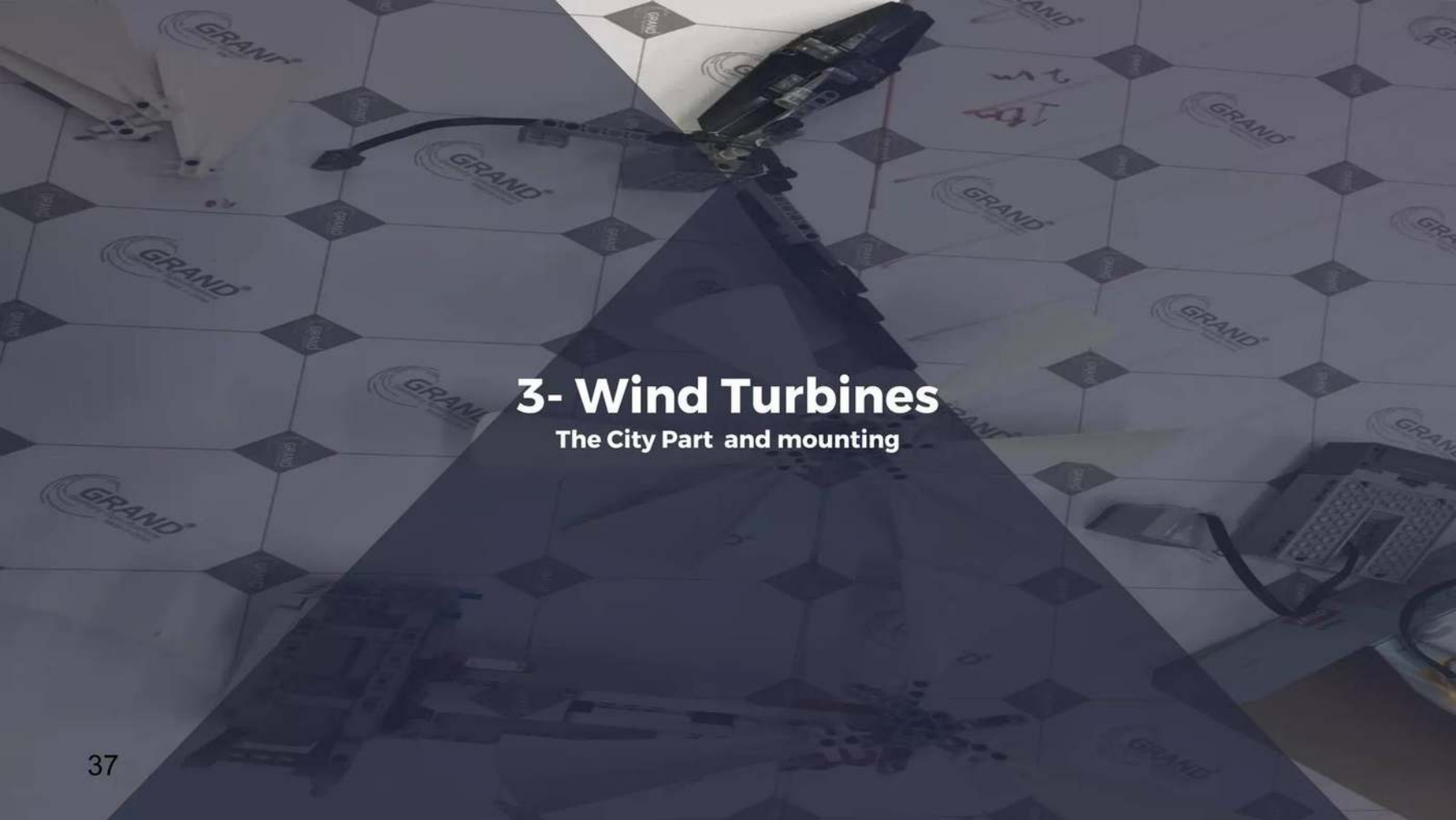


Having solar panel in any city in MENA country like Syria it's so essential because we have a lot of sunny day, that we can use it.

But we add a motor for our solar panel to let ous panel moveable, so it's can track the sun in all days to get the For more efficiency of electricity generation that may reach 300% form stable solar panel.

We add 4 light seseno for our solar panel so it's can know the highest light that we get it from this senses and move the solar panel for this point.

We use LEGO Reasonable Energy kit, that really have a solar panel that can generate Electricity a real Electricity for our project.



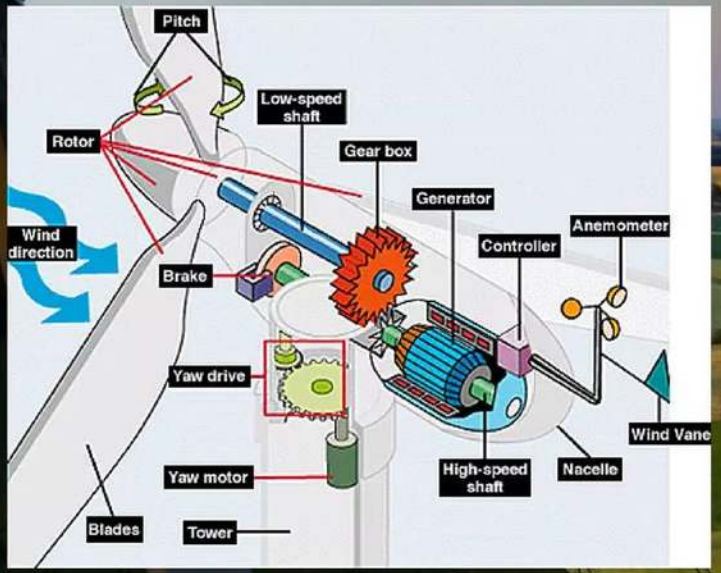
3- Wind Turbines

The City Part and mounting

Wind Turbines

A wind turbine is a device that converts the wind's kinetic energy into electrical power.

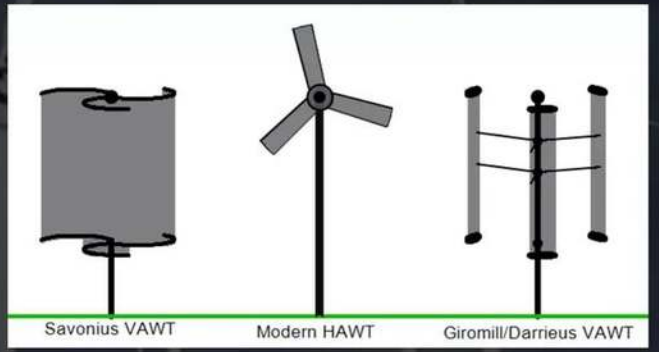
Wind turbines are manufactured in a wide range of vertical and horizontal axis types. The smallest turbines are used for applications such as battery charging for auxiliary power for boats or caravans or to power traffic warning signs. Slightly larger turbines can be used for making contributions to a domestic power supply while selling unused power back to the utility supplier via the electrical grid. Arrays of large turbines, known as wind farms, are becoming an increasingly important source of intermittent renewable energy and are used by many countries as part of a strategy to reduce their reliance on fossil fuels.



Wind Turbines

Modern wind turbines fall into two basic groups: the horizontal-axis variety, as shown in the photo to the far right, and the vertical-axis design, like the eggbeater-style Darrieus model pictured to the immediate right, named after its French inventor. Horizontal-axis wind turbines typically either have two or three blades. These three-bladed wind turbines are operated "upwind," with the blades facing into the wind.

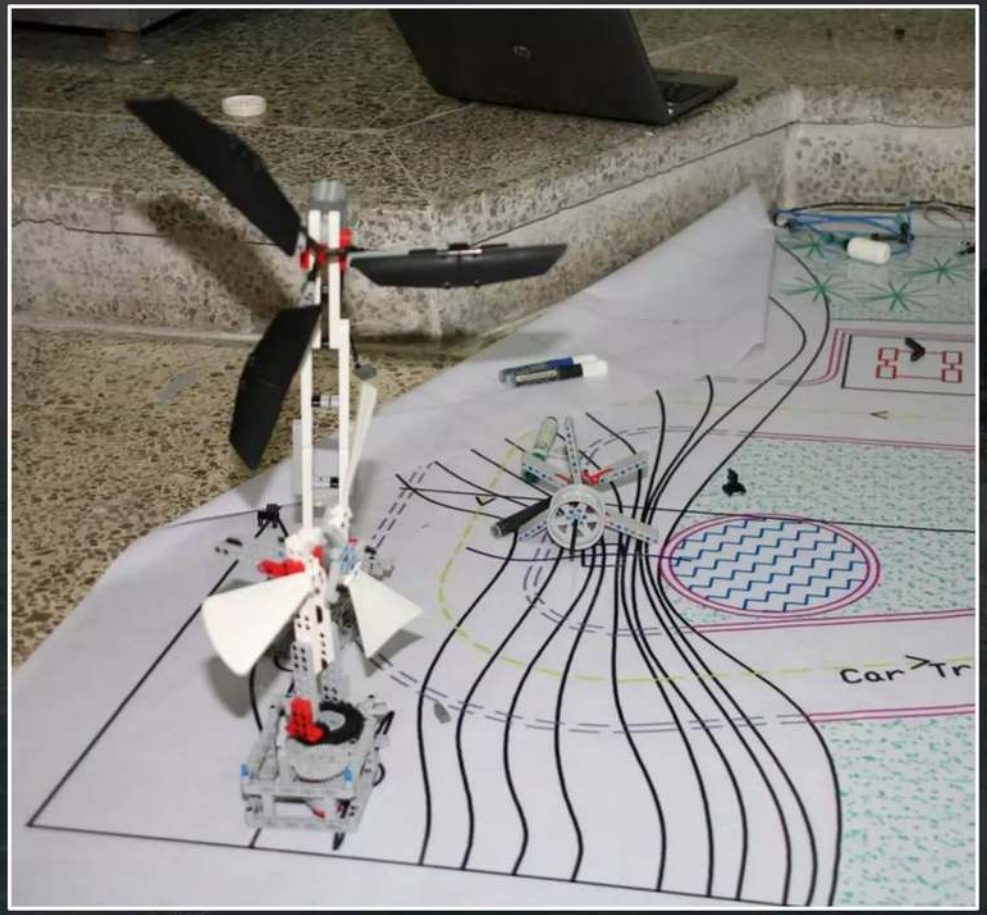
Turbines used in wind farms for commercial production of electric power are usually three-bladed. These have low torque ripple, which contributes to good reliability. The blades are usually colored white for daytime visibility by aircraft and range in length from 20 to 80 meters (66 to 262 ft). The size and height of turbines increase year by year. Offshore wind turbines are built up to 8MW today and have a blade length up to 80m. Usual tubular steel towers of multi megawatt turbines have a height of 70 m to 120 m and in extremes up to 160 m.



Get adavinta of Wind currents with a great and hinges mounting the we have in Lattakia City, make wind turbine it's so personal.

We use 100% LEGO part for this wind turbine, and we put it in top of our mounting, this train it's content to motro.

We build a social Mechanisms that let the turbine move to be in front of the highest wind turbine.



4- Hydropower

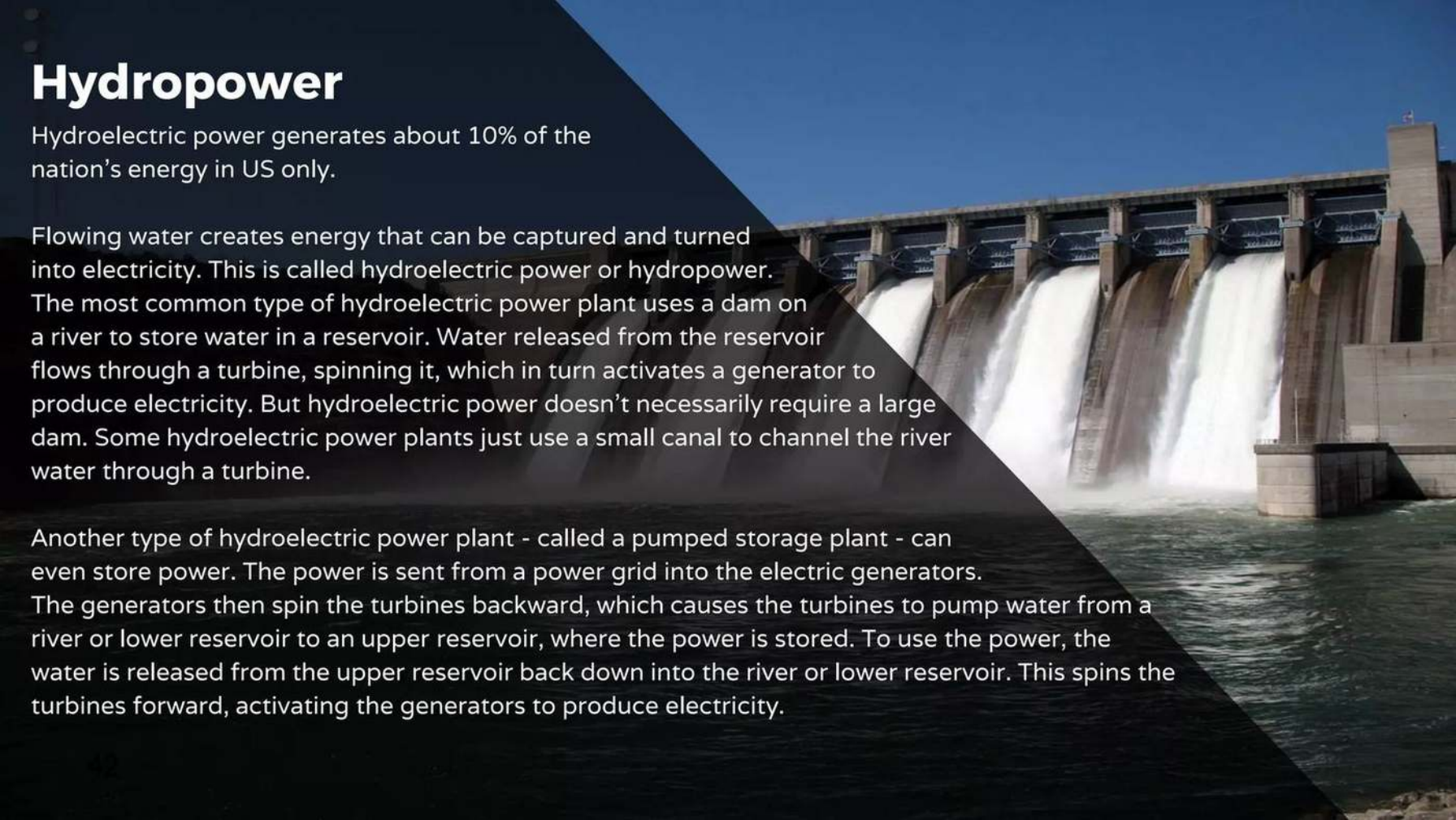
The City Part and mounting

Hydropower

Hydroelectric power generates about 10% of the nation's energy in US only.

Flowing water creates energy that can be captured and turned into electricity. This is called hydroelectric power or hydropower. The most common type of hydroelectric power plant uses a dam on a river to store water in a reservoir. Water released from the reservoir flows through a turbine, spinning it, which in turn activates a generator to produce electricity. But hydroelectric power doesn't necessarily require a large dam. Some hydroelectric power plants just use a small canal to channel the river water through a turbine.

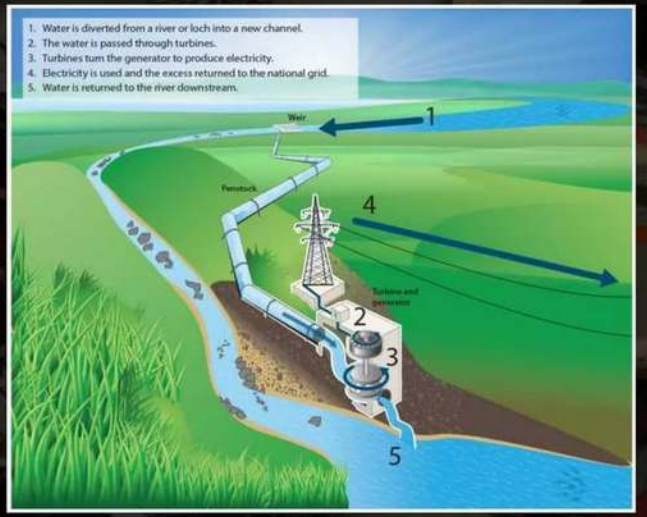
Another type of hydroelectric power plant - called a pumped storage plant - can even store power. The power is sent from a power grid into the electric generators. The generators then spin the turbines backward, which causes the turbines to pump water from a river or lower reservoir to an upper reservoir, where the power is stored. To use the power, the water is released from the upper reservoir back down into the river or lower reservoir. This spins the turbines forward, activating the generators to produce electricity.



Hydropower

Today, the hydropower industry stands as an extremely important part of the sustainable economic development of Scotland. Once a hydropower scheme has been set up and the equipment installed, the cost of electricity generation is highly economic – both in terms of cost and carbon emissions. Currently, around 5000 GWh (Gigawatt hours) of electricity from hydropower are produced every year; that's enough to power roughly half of Scotland's homes. This success is set to continue now that the Scottish Government has identified sustainable hydropower as a key part of Scotland's lower carbon future.

However, if not constructed or maintained in accordance with best practice, hydropower can seriously impact on river ecology and fish stocks. In the worst case, rivers could be dried-up completely for hundreds of metres downstream. So, striking the right balance between protecting the water environment and renewable energy generation is vital.



What is Lattakia mounting with our leak and rever, and we want to make something to buffets for all year moving river in Lattyak, so we want to generate Electricity using hydropower.

We build a custom make blade with a custom made Water pump so we can make a Realistic simulation for our hydropower in real life.

We don not want to build dam (that was our first idea for this part) because building a dam it's cost a lot and make Catastrophic environmental changes to the surrounding natural environment of animals and plants. This thing is harmful to the environment.


5- Compost Power
The City Part and mounting

Compost Power

Compost is organic matter that has been decomposed and recycled as a fertilizer and soil amendment. Compost is a key ingredient in organic farming.

At the simplest level, the process of composting requires making a heap of wet organic matter known as green waste (leaves, food waste) and waiting for the materials to break down into humus after a period of weeks or months. Modern, methodical composting is a multi-step, closely monitored process with measured inputs of water, air, and carbon- and nitrogen-rich materials. The decomposition process is aided by shredding the plant matter, adding water and ensuring proper aeration by regularly turning the mixture. Worms and fungi further break up the material. Bacteria requiring oxygen to function (aerobic bacteria) and fungi manage the chemical process by converting the inputs into heat, carbon dioxide and ammonium. The ammonium ($NH+4$) is the form of nitrogen used by plants. When available ammonium is not used by plants it is further converted by bacteria into nitrates ($NO-3$) through the process of nitrification.

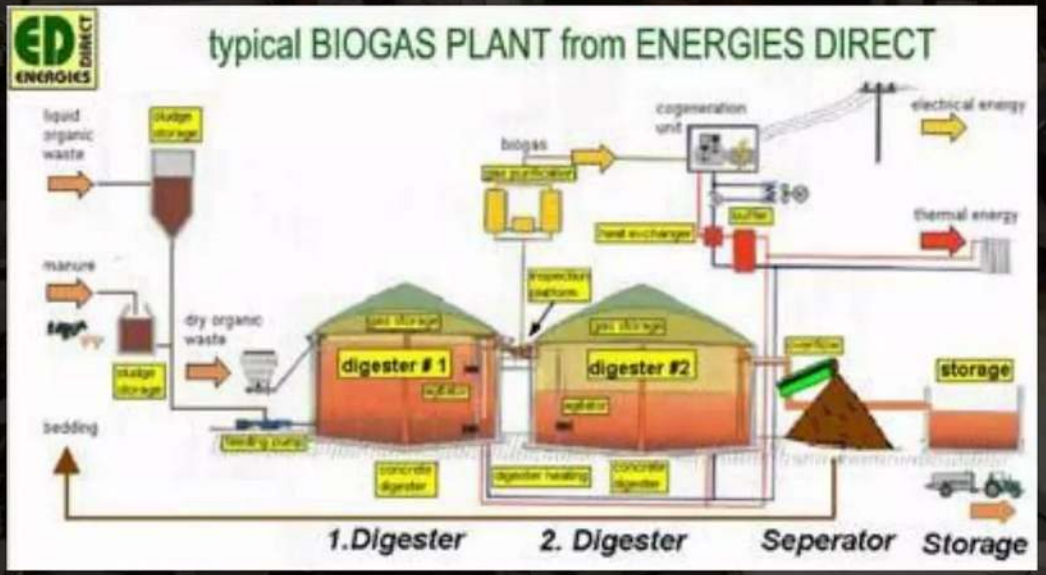
Compost is rich in nutrients. It is used in gardens, landscaping, horticulture, and agriculture. The compost itself is beneficial for the land in many ways, including as a soil conditioner, a fertilizer, addition of vital humus or humic acids, and as a natural pesticide for soil. In ecosystems, compost is useful for erosion control, land and stream reclamation, wetland construction, and as landfill cover (see compost uses). Organic ingredients intended for composting can alternatively be used to generate biogas through anaerobic digestion.

Compost Power

To achieve lower electric costs in a low-emission future, we use gas as fuel for power generation/power plant.

• Methane gas is abundant in supply resource and proven to be a cost-saving alternative fuel.

• Methane gas engine reduces our carbon footprint, the amount of greenhouse gases including carbon dioxide (CO-2) released into the atmosphere, is a nationwide priority and part of a larger plan to combat global climate change. Methane gas provides a superior alternative to conventional fuels. Switching to methane gas fuel from gasoline or diesel reduces CO-2 emissions by up to 30%.



As we know lattakia city a have a very big and Natural and beautiful environment, and when we say natural, we think of taking advantage of the cycle of natural life of plants, and the best use of these materials or the fermentation of these materials through the compost prosser.

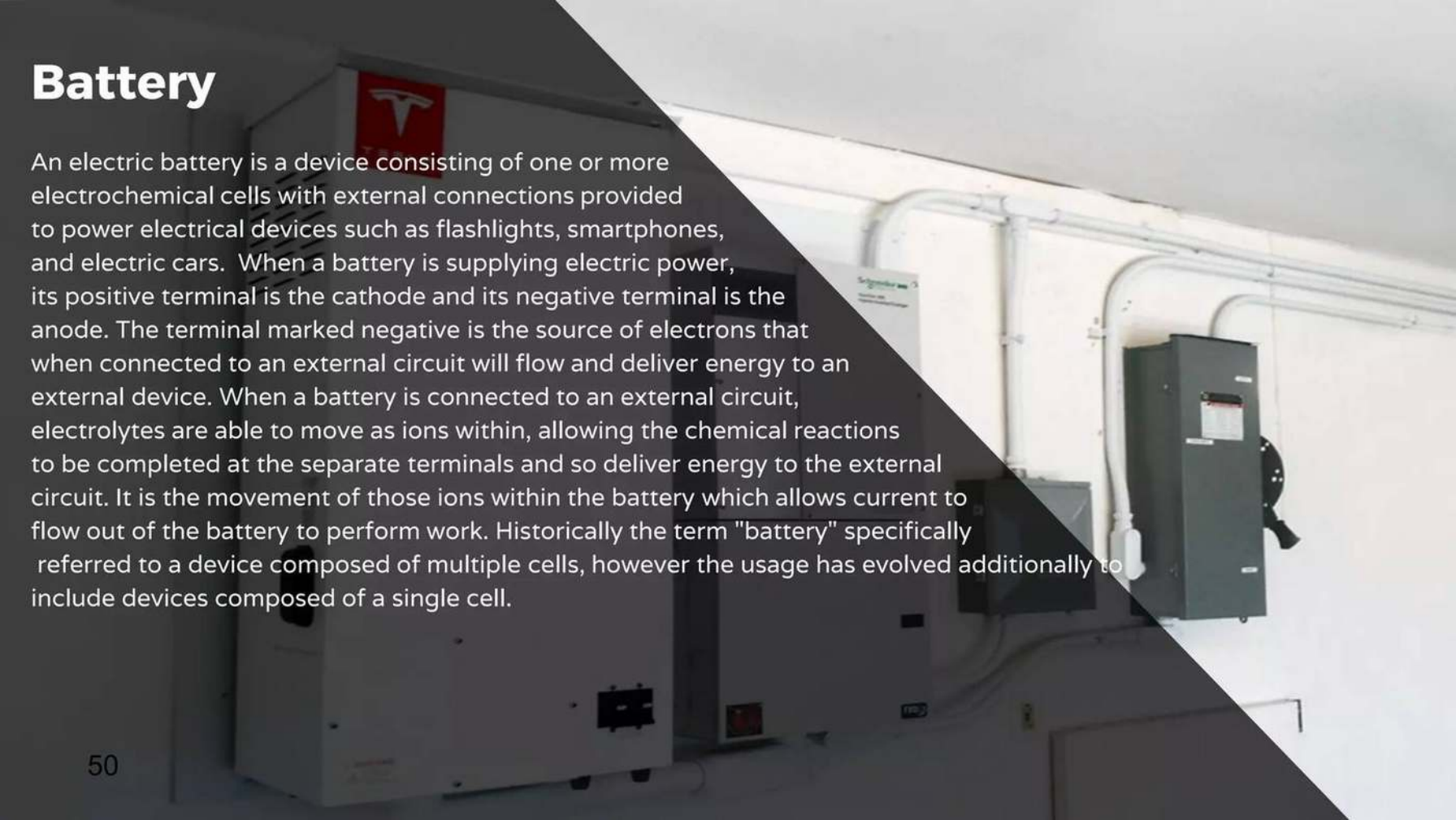
We build small robot as Bulldozer it's main mission for this robot it's colcet the brown Materials like dry leaves, wood chips…

After we collect this mitratel it's recycling center to use this material in compost fermentation, and use the heat and Methane gas as output form this process to generate power for the city.

6- Smart Usage Battery

The City Part and mounting

Battery

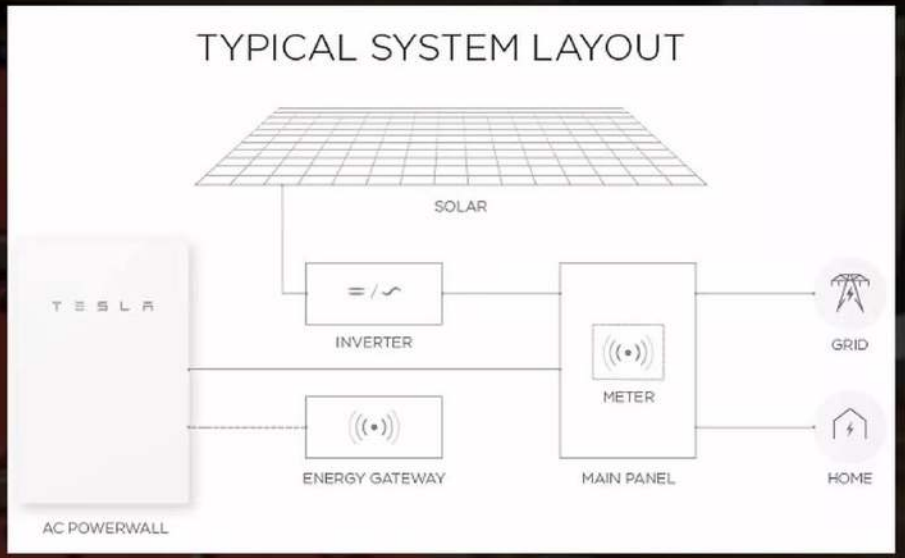


An electric battery is a device consisting of one or more electrochemical cells with external connections provided to power electrical devices such as flashlights, smartphones, and electric cars. When a battery is supplying electric power, its positive terminal is the cathode and its negative terminal is the anode. The terminal marked negative is the source of electrons that when connected to an external circuit will flow and deliver energy to an external device. When a battery is connected to an external circuit, electrolytes are able to move as ions within, allowing the chemical reactions to be completed at the separate terminals and so deliver energy to the external circuit. It is the movement of those ions within the battery which allows current to flow out of the battery to perform work. Historically the term "battery" specifically referred to a device composed of multiple cells, however the usage has evolved additionally to include devices composed of a single cell.

Battary

At its most basic, new generation home energy storage is quite a simple concept, but involves some very high-tech equipment.
Here's how residential battery storage works using the Tesla Powerwall battery system as an example.

- Solar panels convert sunlight to DC (Direct Current) electricity.
- Any surplus DC electricity charges the Tesla Powerwall.
- The inverter converts the DC electricity to AC (Alternating Current) for use in the home.
- The inverter (a special type is needed) can also convert AC to DC to charge the PowerWall using cheap off-peak mains power.



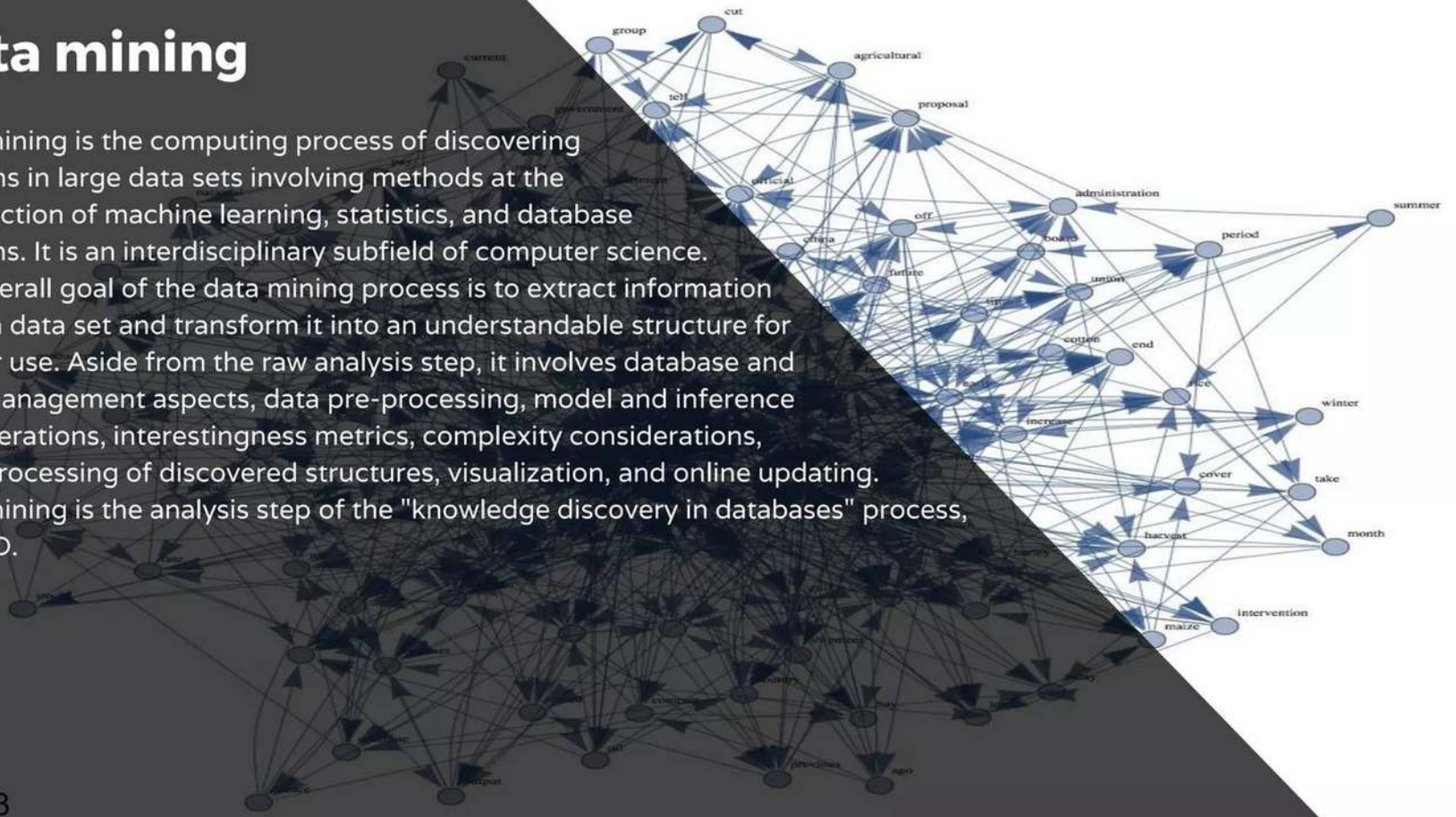
The main mission for the battary in our project
It's to provide power at night as example
Because the solar system can not work, and
The same idea with other power generated in our
City, so we can sey that our Battary are
A temporary alternative for electricity generation

6- Smart City - Data Mining

The City Part and mounting

Data mining

Data mining is the computing process of discovering patterns in large data sets involving methods at the intersection of machine learning, statistics, and database Systems. It is an interdisciplinary subfield of computer science. The overall goal of the data mining process is to extract information from a data set and transform it into an understandable structure for further use. Aside from the raw analysis step, it involves database and data management aspects, data pre-processing, model and inference considerations, interestingness metrics, complexity considerations, post-processing of discovered structures, visualization, and online updating. Data mining is the analysis step of the "knowledge discovery in databases" process, or KDD.



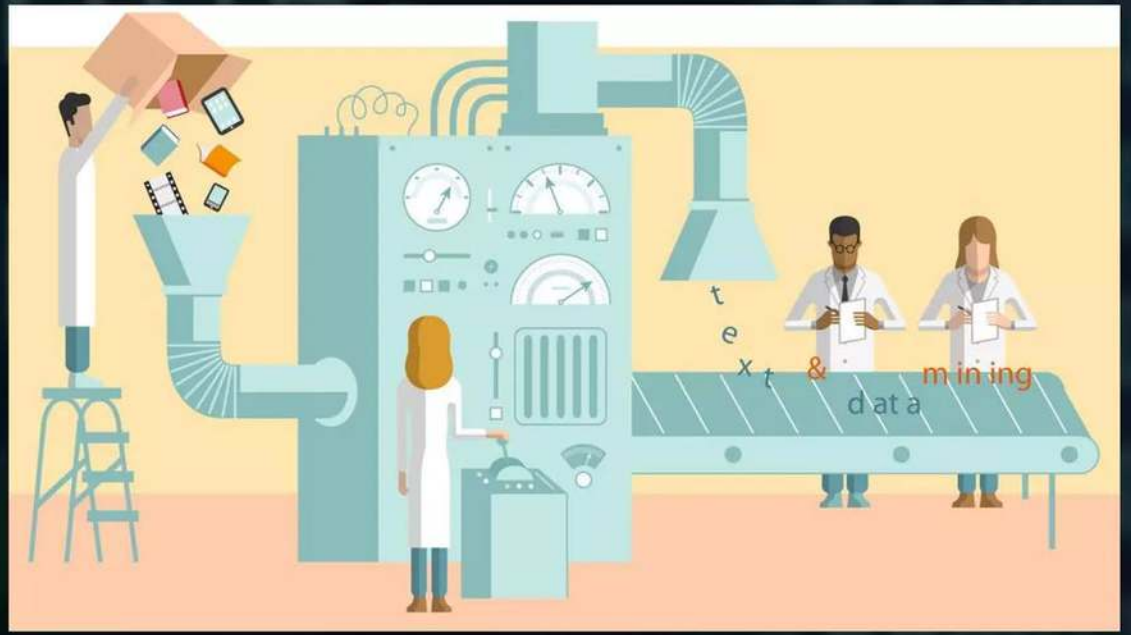
Data mining

Cross Industry Standard Process for Data Mining (CRISP-DM) which defines six phases:

1. Business Understanding
2. Data Understanding
3. Data Preparation
4. Modeling
5. Evaluation
6. Deployment

or a simplified process such as

1. Pre-processing
2. Data Mining
3. Results Validation.

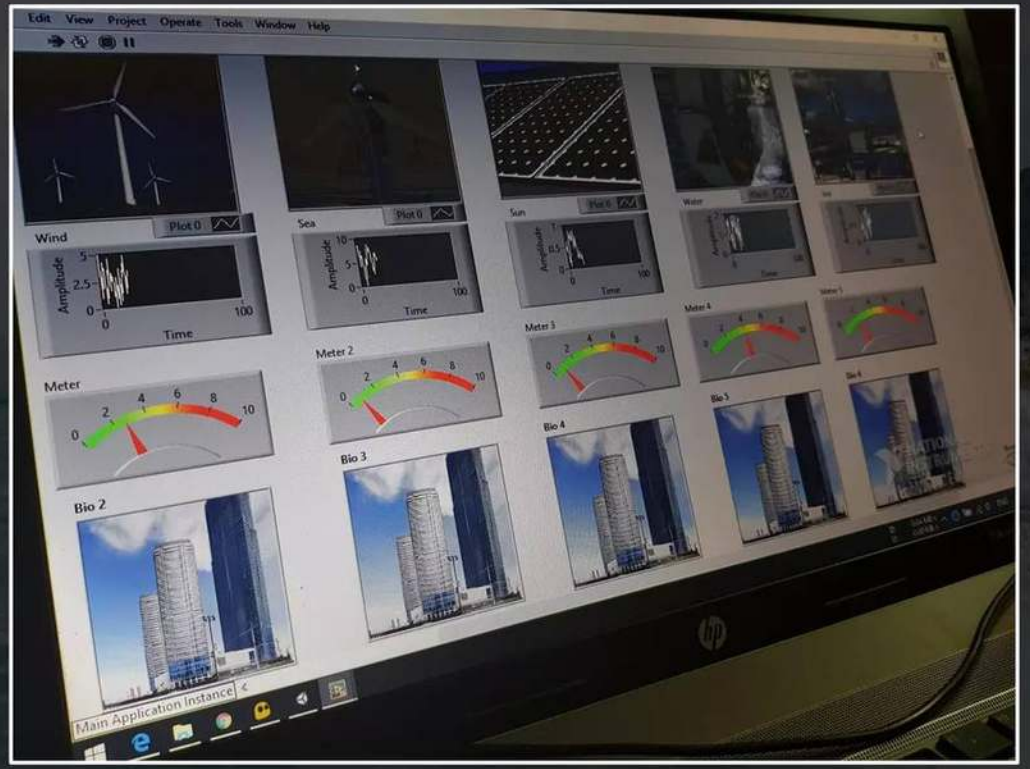


The hard challenge for smart city is not generated power as how this power it's usage and how much it's Effectiveness of this useg.

And the best way to start in this point it's collecting data, you should have data about every device using power from sensor to camera and image processing and more more.

But this data with our a Pattern or identification it's useless, because of that we want to use a great method name it Data Mine.

We build a big dashboard of data using LabView software to degraph for us how much power the city it's generat and how much power the city it's use. And in this way to can use this kind of data to track and analysis every part of our city, the part who work great and Effectiveness in using the power we must work to develop it more, and the part how have problem at using this power we must solve and fix it. All of that happening thanks for big data that we have.




What about
People?

6- Vertical farming

The City Part and mounting

Vertical farming

Vertical farming is the practice of producing food and medicine in vertically stacked layers, vertically inclined surfaces and/or integrated in other structures (such as in a skyscraper, used warehouse, or shipping container). The modern ideas of vertical farming use indoor farming techniques and controlled-environment agriculture (CEA) technology, where all environmental factors can be controlled. These facilities utilize artificial control of light, environmental control (humidity, temperature, gases...) and fertigation. Some vertical farms use techniques similar to greenhouses, where natural sunlight can be augmented with artificial lighting and metal reflectors.

Vertical farming

precisely engineering all the necessary components required and fitting it into a unit that takes up only 4 sq ft of linear space. It is simple to operate and affordable for most. Introduce the power of CEA into your own home, and experience the yield that was previously only available to scientific institutions and commercial agricultural businesses.

Grow your own fresh produce without having to pay an exorbitant price. You can save on your supermarket expenses and recoup your investment on our Cultivator in just a year or two (depending on whenever you decide to back us – the earlier the faster you recoup your outlay in nutritious greens). Our Cultivator is a simple yet elegant solution to address food sustainability, safety, security and justice issues.

We build a special box from wood, and we add 2 fan there mission to control the temperature and Humidity inside this box, so we can provide The ideal environment is the plant that we would like to plant.

In In addition for that we have Floral light inside it and that can help us in speed up the time our plant need to grow, because there 24/24 hours growing for plant thanks for Photosynthesis.

Last things all the root of our plant in Connected with a water, this water can provide the food and water our plant need to grown up.

7- Autonomous Car

The City Part and mounting

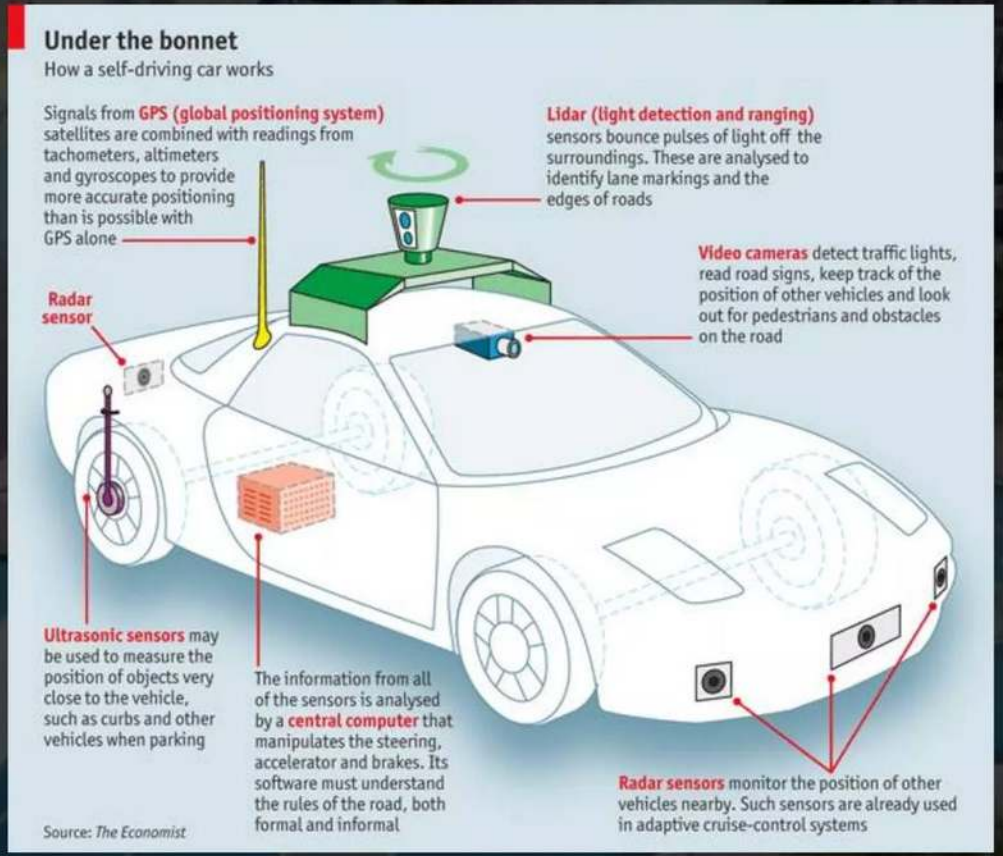
Autonomous Car

An autonomous car (also known as a driverless car, auto, self-driving car, robotic car) is a vehicle that is capable of sensing its environment and navigating without human input. Many such vehicles are being developed, but as of May 2017 automated cars permitted on public roads are not yet fully autonomous. They all require a human driver at the wheel who is ready to take control of the vehicle immediately at any time.

Autonomous cars use a variety of techniques to detect their surroundings, such as radar, laser light, GPS, odometry, and computer vision. Advanced control systems interpret sensory information to identify appropriate navigation paths, as well as obstacles and relevant signage. Autonomous cars have control systems that are capable of analyzing sensory data to distinguish between different cars on the road, which is very useful in planning a path to the desired destination.

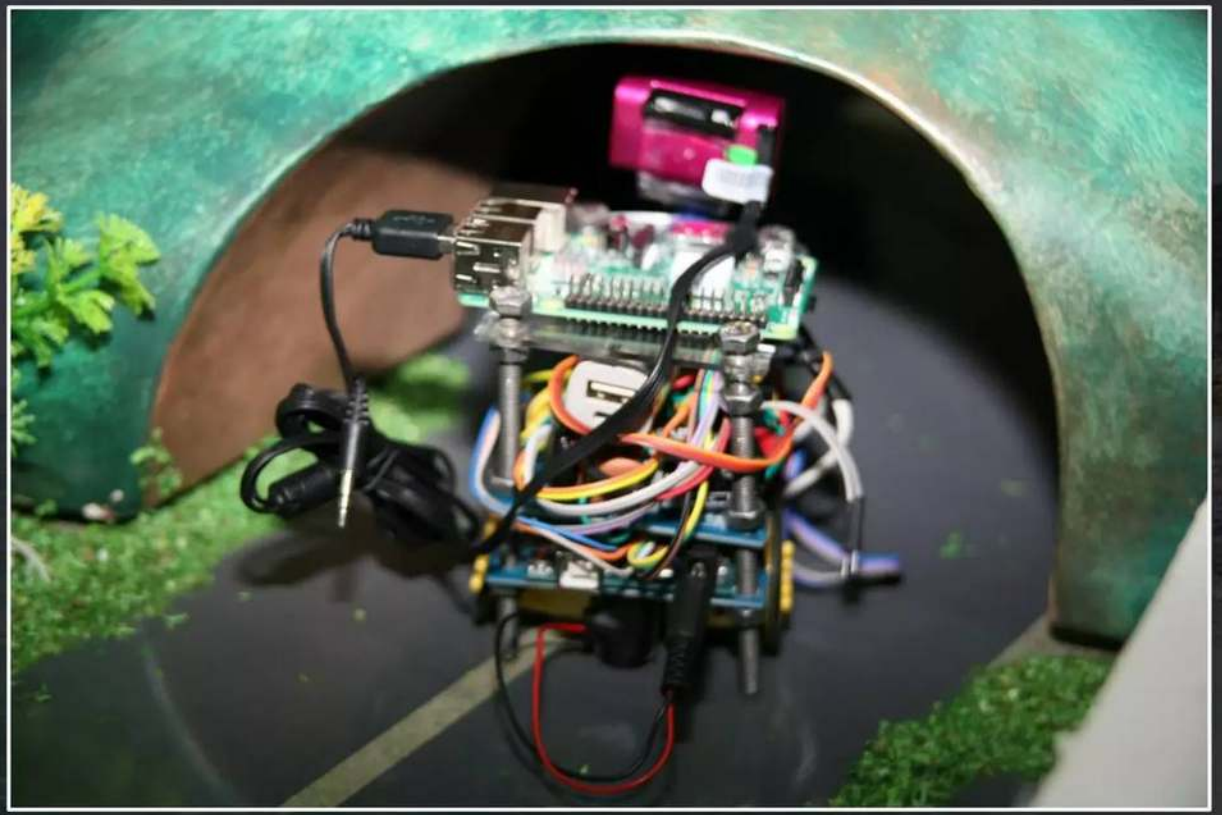
Autonomous Car

Modern self-driving cars generally use Bayesian Simultaneous localization and mapping (SLAM) algorithms, which fuse data from multiple sensors and an off-line map into current location estimates and map updates. SLAM with detection and tracking of other moving objects (DATMO), which also handles things such as cars and pedestrians, is a variant being developed by research at Google . Simpler systems may use roadside real-time locating system (RTLS) beacon systems to aid localisation. Typical sensors include lidar and stereo vision, GPS and IMU. Visual object recognition uses machine vision including neural networks. Educator Udacity is developing an open-source software stack



We really want to build a really automation car with camera and Image Processing and machine learning for our car, but working with arduino and LEGO EV3 Controller are really make this mission it's so hard Because this kind of tool do not support that.

But to keep our simulation work we make our car follow the line, using 3 light sensors, and working in PID follow line algorithm.



8- Pneumatics Garage

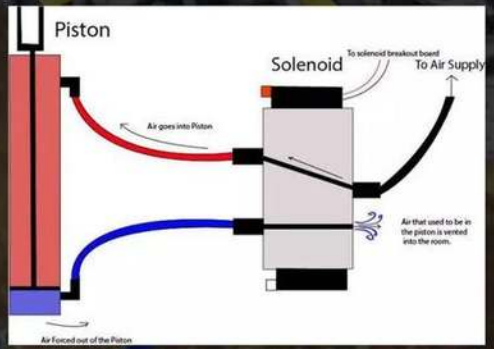
The City Part and mounting

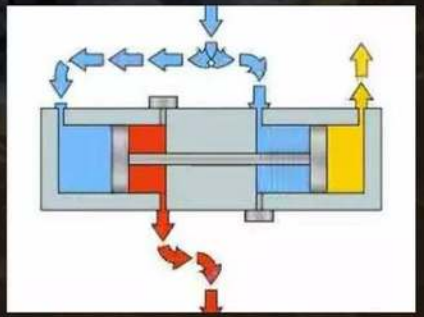
Pneumatics Garage

Pneumatics is a branch of engineering that makes use of gas or pressurized air.

Pneumatic systems used in industry are commonly powered by compressed air or compressed inert gases. A centrally located and electrically powered compressor powers cylinders, air motors, and other pneumatic devices. A pneumatic system controlled through manual or automatic solenoid valves is selected when it provides a lower cost, more flexible, or safer alternative to electric motors and actuators.

Pneumatics also has applications in dentistry, construction, mining, and other areas.





Pneumatics Garage

Pneumatic systems in fixed installations, such as factories, use compressed air because a sustainable supply can be made by compressing atmospheric air. The air usually has moisture removed, and a small quantity of oil is added at the compressor to prevent corrosion and lubricate mechanical components.

Any compressed gas other than air is an asphyxiation hazard—including nitrogen, which makes up 78% of air. Compressed oxygen (approx. 21% of air) would not asphyxiate, but is not used in pneumatically-powered devices because it is a fire hazard, more expensive, and offers no performance advantage over air.

We can mention cars in our city, with out talking about the place those cars should stop and barking.

We want to save space as much we can, becouse of that the idea of Garage with multiple floor, especially under the ground.

And for save the power in our city we depend 100% in this part of our project in pneumatics to move up or down the garage and all of that happing thanks for air pressure.

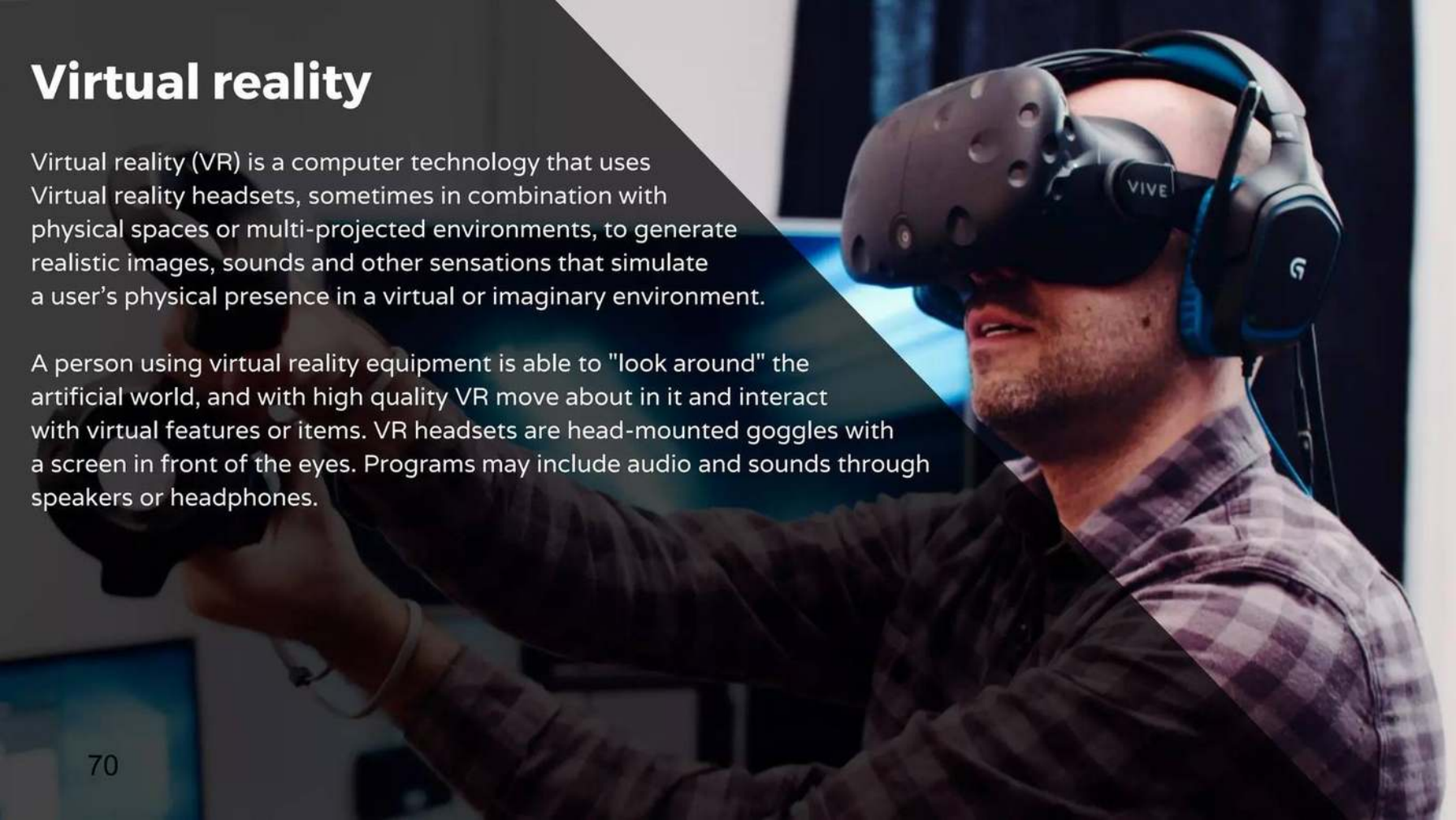
9- Virtual reality - input/output

The City Part and mounting

Virtual reality

Virtual reality (VR) is a computer technology that uses Virtual reality headsets, sometimes in combination with physical spaces or multi-projected environments, to generate realistic images, sounds and other sensations that simulate a user's physical presence in a virtual or imaginary environment.

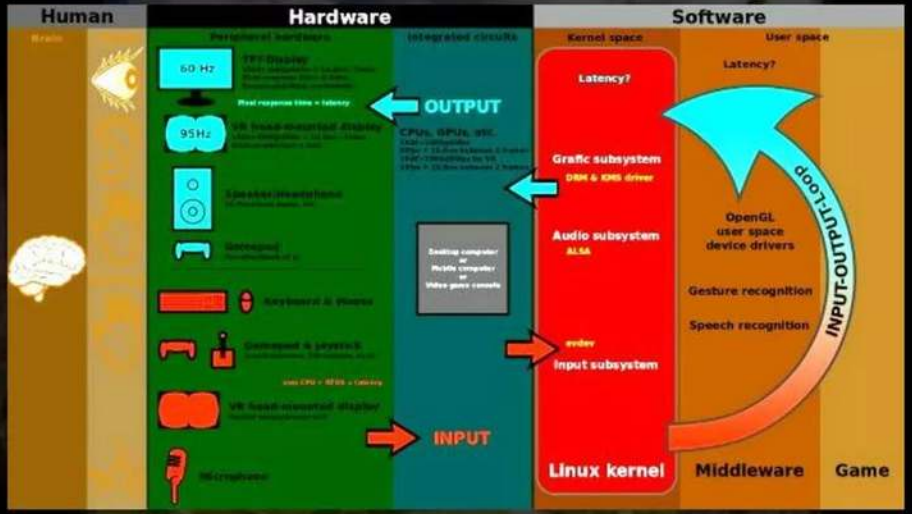
A person using virtual reality equipment is able to "look around" the artificial world, and with high quality VR move about in it and interact with virtual features or items. VR headsets are head-mounted goggles with a screen in front of the eyes. Programs may include audio and sounds through speakers or headphones.



Pneumatics Garage

All modern VR displays are based on technology developed for smartphones including: gyroscopes and motion sensors for tracking head, hand, and body positions; small HD screens for stereoscopic displays; and small, lightweight and fast processors. These components led to relative affordability for independent VR developers, and lead to the 2012 Oculus Rift kickstarter offering the first independently developed VR headset.

Independent production of VR images and video has increased by the development of omnidirectional cameras, also known as 360-degree cameras or VR cameras, that have the ability to record in all directions, although at low-resolutions or in highly compressed formats for online streaming. In contrast, photogrammetry is increasingly used to combine several high-resolution photographs for the creation of detailed 3D objects and environments in VR applications.



It's so great and cool to try new technology, a technology it's developing in those day, like VR, we want to build an app that can stream for us every things happing with the city in one screen and in one Virtual Environment, and to do that we built our application in Unity framework and we use Samsung Gear VR kit to let our app work.

For streaming webcam directly for our app in Gear VR we use a Raspberry Pi that stream the video feed as IP webcam broadcast.

Our next steps to make output form our app to really life objects, and we Looking forwarded to do that in Costa Rica WRO 2017 ;-)

10- augmented reality

The City Part and mounting

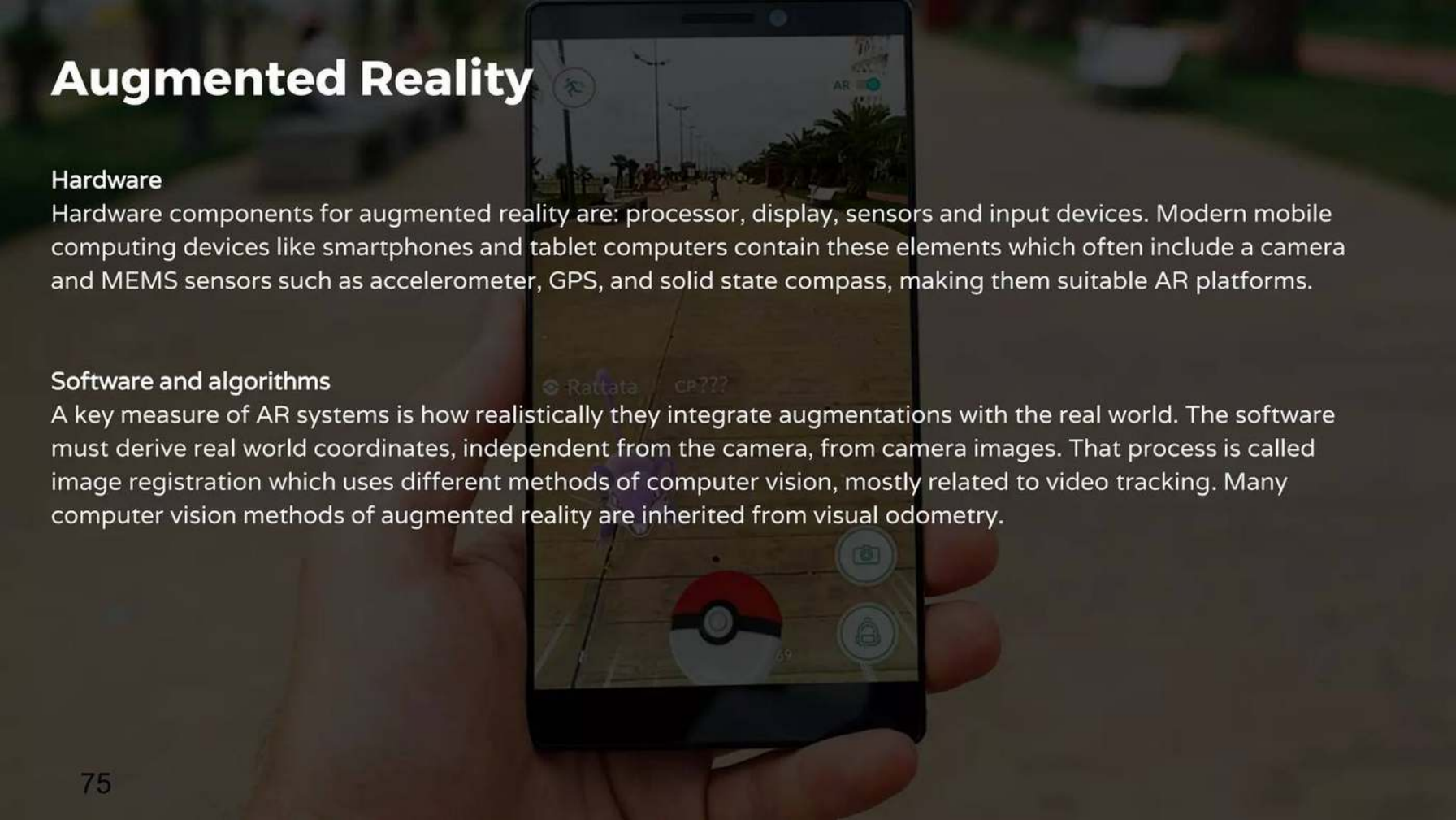
Augmented Reality

(AR) is a live direct or indirect view of a physical, real-world environment whose elements are "augmented" by computer-generated or extracted real-world sensory input such as sound, video, graphics or GPS data. It is related to a more general concept called computer-mediated reality, in which a view of reality is modified (possibly even diminished rather than augmented) by a computer.

Augmented reality enhances one's current perception of reality, whereas in contrast, virtual reality replaces the real world with a simulated one. Augmentation techniques are typically performed in real time and in semantic context with environmental elements, such as overlaying supplemental information like scores over a live video feed of a sporting event.

With the help of advanced AR technology (e.g. adding computer vision and object recognition) the information about the surrounding real world of the user becomes interactive and digitally manipulable. Information about the environment and its objects is overlaid on the real world. This information can be virtual or real.

Augmented Reality



Hardware

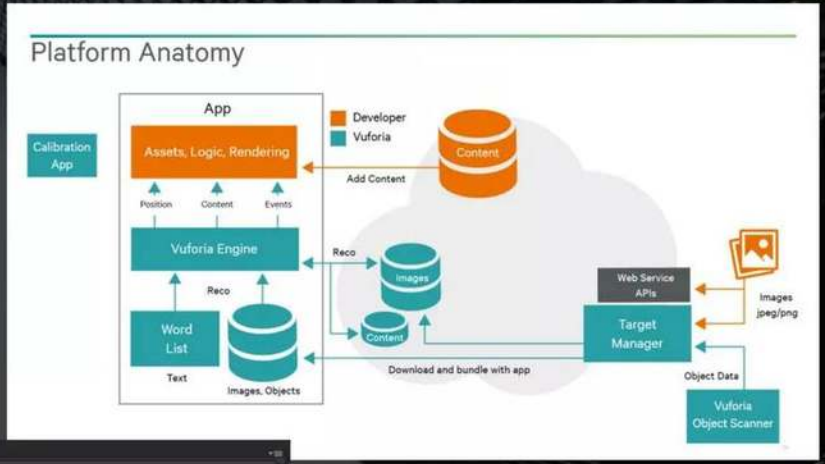
Hardware components for augmented reality are: processor, display, sensors and input devices. Modern mobile computing devices like smartphones and tablet computers contain these elements which often include a camera and MEMS sensors such as accelerometer, GPS, and solid state compass, making them suitable AR platforms.

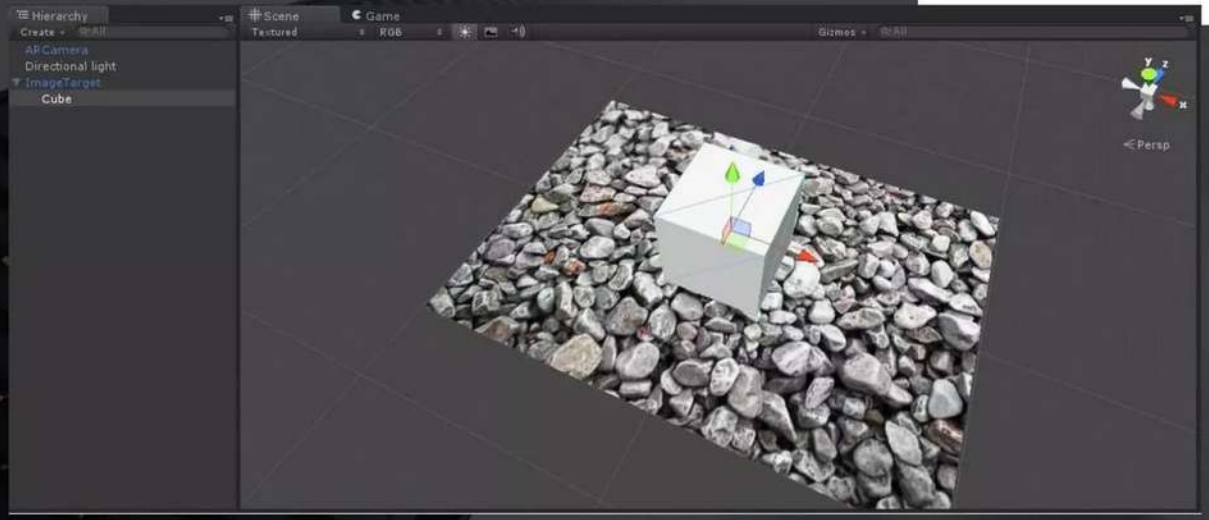
Software and algorithms

A key measure of AR systems is how realistically they integrate augmentations with the real world. The software must derive real world coordinates, independent from the camera, from camera images. That process is called image registration which uses different methods of computer vision, mostly related to video tracking. Many computer vision methods of augmented reality are inherited from visual odometry.

Not every one have a VR kit to Experience the virtual reality. But AR Augmented reality Technology You need only your mobile phone, imagine a mare in front of a statue or a tourist guide, just take your phone towards the camera on the statue and you will get as much information as you need. This is exactly what we wanted to build in the Smart Medenta to connect history with the future, because those who have no history have no future.

We build our app using Unity and Vuforia service for AR image Processing and targeting.


Platform Anatomy
App
Calibration App
Assets, Logic, Rendering
Position
Content
Events
Vuforia Engine
Reco
Word List
Text
Images, Objects
Developer
Vuforia
Content
Add Content
Reco
Images
Content
Download and bundle with app
Web Service APIs
Target Manager
Images jpeg/png
Object Data
Vuforia Object Scanner


Hierarchy
Create
ARCamera
Directional light
ImageTarget
Cube
Scene
Game
Textured
RGB
Gizmos
Persp

11- First Response – Automation Drone

The City Part and mounting

Automation Drone

Unmanned aircraft (most people call them ‘drones’) is a sector of aviation that is developing very fast and has a great potential for producing new jobs and growth. The term ‘unmanned aircraft’ includes very large aircraft similar in size and complexity to manned aircraft, but also very small consumer electronics aircraft.

In 1849 Austria sent unmanned, bomb-filled balloons to attack Venice. UAV innovations started in the early 1900s and originally focused on providing practice targets for training military personnel.

Our drone it's self driving drone too. You just need to set here target place, or pro-program it's move before the Drone tack off.

All that happing thanks for SDK and open code for this drone by the manufacture.

The mine mission of this drone it's make scan for some area to track all the city event and dangers it's could happing. By using Image processing and Machine learning we can track any accident we can know if there any fire happing or could be happing especially in mounting part with so mush forest, so the drone can know if there some area have high temperature then normal so it's can send alarm for potential fire.

Thanks

Any questions?

Tarek Sheikh Al-Shbab

tarepsh@gmail.com

+963 962412986


The END.