Abstracts of the Projects

Cement. Glass. Linen Building block (C.G.L.B)

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Abstract:

Egypt faces a lot of grand challenges. The overpopulation problem is dangerous as it consumes most of the countries resources. According to the population in Egypt is 96.3 million people in 2018. The total area of Egypt is mainly desert areas with limited resources and this causes the problem of arid areas. 95% of the Egyptians live on 5% of the total area of Egypt and this causes the problem of urban congestion. The purpose of this project is to solve problems of arid areas, urban congestion, and pollution by using recycling garbage. the project includes how to make economic building blocks from waste materials to protect the environment from pollution. After research, the best materials chosen for constructing the building block are cement, glass powder (recycled material), and linen. After making the block, the test plan was conducted according to static strength design requirements. In the dry stability test, the block could carry 30 kg. the ratio of static strength is load/weight = 30/1,150 =26. in the wet stability test, the block could carry The ratio of static strength is load/weight =70 / 1,300 =58.3. By working out the results, the block met the design requirements, characterized by high efficiency to resist being in the water, its low cost, and safety. Finally, this glass, linen, and cement block is a suitable building brick for conquering the desert, and hence for solving the problems of arid areas, urban congestion, and recycling in Egypt.

Push and Produce

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Abstract:

Egypt is surrounded by several problems which prevent its progress. The greatest challenges that had to deal with are lacking sources of energy, recycling wasted energy, population growth, pollution, and public health. According to the report of the international renewable energy agency (IRENA), renewable power can only provide 15 % of the total final energy needs. So in this semester, we are working on recycling the wasted mechanical energy to generate electricity taking advantage of population growth in Cairo as the number of passengers that use the metro stations is reach 5 million people per day according to the report of Railway technology in Egypt. So, the wasted mechanical energy is used by turning the passenger the blades of the turnstile machine in the metro which had been connected with a metal pulley. We connected the pulley with a smaller one through a belting to rotate the smaller pulley more than the bigger one. In addition, the generator had been connected by the smaller pulley in order to generate electricity. Moreover, the battery is used to store this power, that is could be used later to run the turnstile without the need for other sources of energy as it needs 72 w to run. After constructing the prototype, the efficiency had been tested by measuring the volts and amperes with an avometer to calculate the numbers of watts that had been generated which are 2.5 watts by the efficiency of 21% while the total cost is 30 pounds. So, the conclusion is that the prototype met the design requirements that had been chosen which are high efficiency, low cost, eco-friendly, and safety to solve the problem that we are addressing.

Bin it to win it

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Abstract:

Egypt is surrounded by many constraints that prevent its progress such as pollution of soil, water, and air, public health, and recycling of waste materials. An essential type of pollution is water pollution that was especially caused by microplastics which is not a specific kind of plastic, but rather any type of plastic fragment that is less than 5 mm in length according to the U.S. As a result, the chosen solution to removing the microplastics from the water consists of two parts. The first part is the filtration process and this process occurs when the impure water inters the polypropylene plastic bin and passes through three cycles. Each cycle removes a specific size of microplastics from the largest size to the smallest one. The first one is made of a specific good type of plastic and has many pores. The second one is made of the same type of plastic as the first one, but it has fewer pores' sizes. The third one is made of two different types of fiber nets. The distingue of the fiber net is that made of fiber, and it doesn't affect the pH of the water. the second part is pulling and pumping the filtered water to another beaker by using a wiper motor. After constructing our prototype and testing it many times, it was noticed that it can remove 0.995 gm in 1000 ml of water. Not only that but also the design requirements were achieved which are, high efficiency as its efficiency is 99.5%, high amount of removed microplastics as the removed microplastics was 0.995 gm in 1000 ml, Low cost 145 L.E, no change in pH, and safety. This prototype can be installed in the water treatment plant, so this solution will purify the water from microplastics and their negative effects.

Improving the Efficiency of the Solar Panels to Produce Electricity

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Abstract

As the world faces an impending death of fossil fuels, alternative sources of energy must be found [Rhodes,2010, p.2]. Solar energy is one of the most important sources of alternative energy, it is produced by the Sunlight and it is a non-vanishing renewable source of energy that is free and ecofriendly. The solar energy flux reaching the Earth's surface is quite wide and its intensity varies according to the timing of the day and geographic location, it also represents a few thousand times the current used by the world's population in one year. The potential of this resource is enormous and makes solar energy easily compensate for the energy drawn from the nonrenewable sources of energy that are aimed at reducing the global emissions of greenhouse gasses into the atmosphere. So, utilizing this energy for electrical power could provide a renewable, low carbon energy source, and presents an attractive way of mitigating climate change. Some systems have been installed to convert this solar energy into electric energy and it is constantly being developed. But till now the use and scope of solar energy are limited moreover the efficiency of the system is also low due to which the output is not sufficient as compared to input as observed in some installed systems the efficiency is not more than that 27% [Arya, 2012]. After discussing and studying the factors that affect the efficiency of the solar panels, If the recommendation applied in the correct way, the efficiency will be increased and improved.

Techno-industrial

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Abstract

Nowadays, Egypt has many dilemmas considered grand challenges, for an instant, increasing the industrial bases of Egypt and improving the scientific and technological environment for all. It has been noticed that the solution to these challenges is closely related to technology. By using the modern technology of AI, we could make an efficient system that can overcome manufacturing. The problem is the much time spent testing the products on the factory's production line. That tends to decrease the efficiency of the products, which affects the industry. Manufacturers have been looking for effective ways to save time and improve accuracy at their factories. One of these ways is to use automation for making decisions depending on coding and previous experience. Indeed, automating production lines can help manufacturing companies produce more in less time, which increases production rates. They can also reduce safety risks, improve product quality, and increase customer satisfaction. The solution is based on scanning products in the production line and comparing them with the data set and previous experience. Then, if the product is faultless, it will pass to the next stage of manufacturing. But if it has defected, the system will stop and give a warning. After building the code model using AI algorithms, the accuracy was 96.6% in a shorter testing time. Thus, a testing plan was carried out to ensure achieving design requirements, including the system containing AI as the data demonstrated that the system is learning from the inputs and outputs, correctly identifying data from new datasets, and has high efficiency and high accuracy.

Applying Oil-Method on The Extraction of Four Types of Microplastics

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Abstract

Polluted water is a great concern that alters the ecosystem. Human populations are using oceans as their household dustbins and microplastic is one of the components which are not only polluting shorelines, but also fresh water bodies globally. The purpose of this paper is to address an efficient and affordable solution to increase sources of clean water by filtering the polluted water from microplastic. It also unites prior researches that formerly succeeded to solve the problem. The paper investigates the extraction of microplastics from oceans by using a chemical method. It depends on the chemistry concept "like dissolves like." The experiment was made with simple materials and achieved great results. The results showed that the experiment fulfilled the design requirements of the High Efficiency, pH, Applicability, and Eco- friendly. The results of the experiment indicate that it is valid to be applied and fully prepare to take capitalize from.

Converting Wasted Sound Energy to Electricity by Using Condenser Microphone and Power Amplifier

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Abstract

One of the most vulnerable global challenges that face the world is relying heavily on oil, natural gas, and coal for energy needs, besides increasing the dependence on fossil fuels. These fuels draw on lots of resources that will eventually diminish, making them too expensive or environmentally damaging to recover. Wastes are convertible to useful energy forms like polluted air or even sound waves. This research's primary investigation is to present using the sound waves that come out from the factories' machines' and converting it to electricity. The produced electricity will return to the machine and operate it without using an external source of electricity. The experiment was done using a power amplifier, capacitors, electric condenser microphone, potentiometer, and ohms. The experiment results fulfilled the design requirements as cost reduction, high efficiency and quality, and long endurance. The prototype output of electricity was 16V, and its efficiency was 15%. One of the most vulnerable global challenges that face the world is relying heavily on oil, natural gas, and coal for energy needs, besides increasing the dependence on fossil fuels. These fuels draw on lots of resources that will eventually diminish, making them too expensive or environmentally damaging to recover. Wastes are convertible to useful energy forms like polluted air or even sound waves. This research's primary investigation is to present the idea of using the sound waves that comes out from the factories' machines and converting them to electricity. The produced electricity will return to the machine and operate it without using an external source of electricity. The experiment was done using a power amplifier, capacitors, electric condenser microphone, potentiometer, and ohms. The experiment results fulfilled the design requirements as cost reduction, high efficiency and quality, and long endurance. The prototype output of electricity was 16V, and its efficiency was 15%.

T U B A

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Abstract

Urban congestion and arid areas are from the dilemmas that Egypt face. There are many solutions to solve these problems, but we are asked this semester to solve the problems by improving recycling garbage in Egypt and making a building block from recycled materials that pollute the environment. After researching the prior attempts, we decided to make a building block from Rice Straw, Building collapse waste, Iron swarf and Cement. We chose specific requirements that we want the solution and the prototype to meet it, which are Availability, Eco-Friendly, Affordability, Durability and Sustainability. The choice of used materials was based on scientific reasons to apply the pervious requirements, as the building block contain waterproof material which is the Cement, thermal insulator and humidity resistant which is Rice straw, and useful hard materials as Iron swarf and Building collapse waste. All of these make the building block achieve great results while testing the prototype, in which the block is 932 gram and held 20 kg in the dry stability test with something small bending measurements. Despite using the recycled materials and the commercial material with a ratio 4:3 respectively. The building block also show positive results in the wet stability test, as the block became more durable after the test, and the results met all the design requirements.

A Review On Air Pollution and the Applicable Methods to Tackle it

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Abstract

The most vulnerable global challenges that face the world are the global warming and its effect on climate with deteriorating air quality. Therefore, air pollution has become a growing concern of new civilized world. It is considered as the major environmental risk factor in the incidence and progression of some diseases. Evidence suggesting that persistent environmental pollutants is due to the globalization of industrial production and to the energy needs. Several reports have revealed the direct relation between exposure to the poor air quality and increasing rate of morbidity and mortality. The main investigate of this research is to present the issue of air pollution and discuss the latest solutions findings of fundamental research regarding its consequences on human health. This paper assists whether these findings are effective and ready to be applied in real life application or not. This research integrates some prior solutions for the industries that emit many hazardous pollutants either by using some catalysts like zeolite or techniques like the oxygen enriched combustion to decrease the adverse emissions or using filters like the activated carbon air filter to filter the air from pollutants and between ways to decrease the spreading of the endangerment gases. The results of these findings indicate that these solutions are valid to be applied and fully prepared to take capitalize from. If some of these solutions are implemented on the large scale, the balance between the industrial revolution and the environment would be maintained and enhanced. The review ends with identifying gaps and limitations in some solutions about air pollution and recommended some ways for the world to solve it with some development research needed in the subject area.

COVID-19 Detection from Chest X-ray Images Using Artificial-Intelligence-Based Model Imported in a Mobile Application

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Abstract

COVID-19 has become a public health emergency of international concern since it has rapidly spread within many countries, and its pandemic has continued to overwhelm health-care systems One of the significant challenges in this crisis is to identify and monitor the COVID-19 patients quickly and efficiently. Research efforts are to develop less time-consuming methods to supplement PCR based methods. The purpose of this paper is developing a project that can obtain the highest accuracy in identifying patients affected by COVID-19 in a timely manner. The paper investigates creating a mobile application that uses Deep Learning and Artificial intelligence (AI) algorithms to analyze "Chest X-ray" for suspected individuals and getting immediate, accurate results. This mobile application provides a feature to the user to upload their chest X-ray result for examination using AI and uses a public open dataset and downloaded 1500 images of chest X-ray results of patients who tested positive or suspected of COVID-19 and 1341 normal-chest images and then compare the user's scanned chest X-ray result to this dataset. The user, therefore, will receive the result, and if the developed model detected that the scanned image features are similar to those of the training positive-results data, the user will receive a result of SARS-CoV-2 infection suspicion, and then the mobile application will provide further directions to this user. The results of the test showed that the project fulfilled the design requirements of AI demonstration, High Sensitivity of 99.5%, High F1 score of 0.986, High Specificity 97.57%, High Precision of 97.8%, Mobile app's Easiness of use, and High Accuracy of 94%.

Power of Shrimps

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Abstract:

Pollution is the contamination of water bodies include for example: lakes, rivers, oceans and aquifers, which results when contaminants are introduced into the natural environment. The main goal on these contaminants is on removal of microplastics. The chosen water bodies, which were decided to work on are oceans. Moreover, the project can be used as one of filters' stages for fresh water as another usage of the project. The second portion is recycling these microplastics after their removal. For the chosen solution, chemical materials used are, titanium dioxide, after that using chitosan, silica gel, sodium silicate and cotton. Furthermore, it is intended that it will be applied on moving ships, in order to benefit from its continuous movement with water currents for salty water filtration. For the design requirements, decision was made to work on particles' size, the project's efficiency and change of water's pH. For the particle size, it was concluded that it could remove various sizes after testing. On the other hand, reached high efficiency of microplastics extraction. After studying the project from different aspects, the project is applicable on real world and can be used in various regions on Earth, besides its removal will not need much effort to be recycled.

Demonstration of Use of a Thermoelectric Cooler to Generate Electricity

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Abstract:

It is well known that Egypt faces many grand challenges that hinder its wheel of development. Our current consumption model relies almost entirely on the use of non- renewable energy sources, and one of the dilemmas and consequences for this act is lack of energy resources. That is why we are asked this semester to deal with Wasted energy recovering and trying to avail Egypt of different wasted energy forms to produce a beneficial energy form or electricity. The chosen solution is about recovering the great heat energy that lost from the internal combustion engines, and discharged from the exhaust pipe in various vehicles. It was decided to exploit the Temperature difference between the hot exhaust pipe of the vehicle and the cool air resulted from air resistance, related to Seebeck effect. The main device that has been used is Thermoelectric device (TEC), But it is used in reverse, in order to generate a voltage to operate one of the devices or equipment that related to the vehicle. After the prototype was tested, the results showed that the prototype of a vehicle miniature model fulfilled the design requirements of Cost reduction, Safety, Availability, and Efficiency preservation. In which the device produces 5 Watt, 4 volts and 1.25 Ampere, with a temperature difference of 200 degree Celsius, and this voltage will be increased as the temperature difference in real vehicles increases. The project is valid and offers Egypt a great opportunity to take advantage of the wasted heat energy that released from the vehicles scattered throughout it.

Ai Aliment Wheat Diagnoser

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Abstract

Although Egypt is a great country, there are still daunting challenges ahead of it. An important challenge is to mobilize science and technology to tackle the crises facing Egypt like the Food safety problem. The factors causing the contamination of the food may threaten the safe consumption of it and thereby make the foods harmful to human health. For this reason, it is necessary to utilize various resources to prevent the food from being contaminated in all stages of the food chain, from harvest stages to consumption. Concerning this, the aim of this project is to focus on harvest stages to figure out those crises using AI. After research, it is found that wheat is the most important grain crop in Egypt and grains are, in turn, the most important crop group. Wheat represents almost 10 percent of the total value of agricultural production and about 20 percent of all agricultural imports. Wheat has an important role but wheat diseases spread all over wheat harvest vastly, Wheat rust can attack all above-ground parts of the plant, including the stem and leaves. The rust disease is spread hastily not only through the wheat but also through the plants that surround it. Leaves are affected most commonly, but rust can also be found occasionally on stems, and even flowers and fruit, so protecting it from diseases is our mission. This AI project uses computer vision to train samples of wheat then test them, detect rust, and offer recommended intervention strategies against wheat rust in both leaf and stem and future guide for preventing the disease from coming. Finally, it is concluded that results have approved the competence of the solution in which it has met all the design requirements of accuracy, AI programming, and not traditional programming. In addition, it contributes to the stability of the wheat yield.

A Rivew Research Discussing the Hydropower

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Abstract

No research is ever quite complete. It is the glory of a good bit of work that it opens the way for something still better, and this has repeatedly led to its own eclipse" Mervin Gordon. The purpose of this paper is displaying previous researches for exploiting the hydropower and presenting its weaknesses and strengths that can be evidenced by laws and theories from our subjects in addition to completing our research after analyzing these previous researches. So, as it has been anticipated from the previous research that some types of turbines have its weak points in the material that blades made from it and that can be cavitated in the water, also other techniques that need special conditions to be applied and others that disrupt the landscapes and cannot be eco-friendly as it may cause habitat loss, slope instability and water contamination. After, accurate analysis and discussion for these researches, our findings are research that can modify these all weaknesses. So, what about the wave energy that generated from the motion of the ships. This energy can be harvested by putting turbines on the end of the sides of the ship and installing these turbines with generators after that, this turbine will convert the mechanical energy of waves into electricity. This technique has not negative consequences and it is eco-friendly as it will be on the surface of the water so it will not harm any organisms, also has no effect on the landscapes and water features (oxygen percentage). Eventually, our research will be effective and has no negative impacts and this can be evidenced by certain laws and theories.

Eco sorter

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Abstract

Seeking a better version of Egyptian streets that is not filled with piles of garbage, the biggest amount possible of these wastes must be reused and recycled. Sorting these tons of trash is one of the principal causes that make recycling a grand challenge. This quantity of garbage needs a huge number of laborers. As a consequence of interacting directly with trash, a laborer's safety is not secured because infections may spread through wastes. The purpose of this project is to solve the problems that face sorting recyclables. To achieve efficient sorting, the classification of items has to be accurate and fast. Since all the previous characteristics of successful sorting can be accomplished by computer vision, the selected solution is AI-based. The prototype is a combination of two parts: software (AI-based-based mobile application) and hardware (conveyor belt). Software is responsible for scanning and classifying items into four categories: paper, glass, metal, and plastics. Hardware's function is directing trash items to their categories according to the result received. The prototype was chosen to meet testable design requirements: AI accuracy, prototype's efficiency, and effectiveness of connection between hardware and software. The results were very satisfactory and achieved the requirements as the accuracy of the AI model is 95.5% on average. The efficiency of the whole prototype reached 90%. Moreover, the communication between hardware and software is rated by 100%.

Closed Automatic Microplastic Swallow System

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Abstract

Hoping for a better future which is free of today's problems and fit for the next generations gave us the passion to do whatever it is in order to watch our seeds grow up with benefits. Nowadays, Egypt is suffering from a lot of problems, one of the most challenging problem in this semester is to remove microplastics from water sources to reduce pollution and protect all living organisms. At first, scientists tried to remove plastics from water but the problem worsened as time passed and the plastics deteriorated in water and became microplastics, which are much harder to remove. Their sizes can range to 5 mm and less. After searching and trying to find a decent solution, the idea came up, which is a closed system box has different geological filtration processes with different materials of different porosity and permeability to make sure of collecting most of microplastic's sizes. And all of that was done by a physical mechanism which is responsible for passing the water through it to complete the mission. After performing, the results were successfully reached up to 92.7% of removing microplastics from water.

Smart Block by Using Supporters and Recycling

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Abstract

Achieving progress in Egypt requires recognizing its grand challenges and finding solutions for them. So, our team decided to find a solution for one of Egypt's grand challenges. This semester our capstone helps in solving the problem of arid areas. Arid areas cover most of Egypt's area, at the same time, urban congestion exists in the population attraction cities with high rates. For this reason, we will help Egypt to build houses in arid areas to attract population and decrease urban congestion. We found that developing the smallest building unit of the house which is the block is the best way to solve the challenge. We were asked to make it from recycled materials which will help in decreasing the rate of unused resources in Egypt. After we have done many researches about the problem and its details, we decided to make our block from a matrix material called Blanco feel and two recycled materials which are plastic and iron turnings.

P L A S T E C

Purification Long-life Affordable System To Eliminate Contaminants

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Abstract

It is well known that Egypt faces many grand challenges that hinder its wheel of development. One of these dilemmas is the problem of Water pollution with tiny contaminants that are filling water sources and working their way into the aquatic creatures and then our bodies. That is why we are asked this semester to deal with elimination of microplastics from water and try to avail Egypt of these hazardous particles in upcycling processes with the perceived environmental value. The chosen solution for the problem is a chemical-based one uses carbon and fiber; it works on microplastics-contaminated turbid water purification through 3 stages only instead of more than 7 stages to purify water as in water plants. During working on the project, a way for having reusable fiber, that treats liters of water with only single grams, has been discovered. After the prototype was tested, the results showed that the prototype of a water plant system miniature model fulfilled the design requirements of Efficiency preservation, Constant chemical properties, and Changing water turbidity, In which the system achieved an efficiency of 95.4% for microplastics removal, water amount preservation and a high percentage for turbid water purification with preserving its chemical properties of pH, TDS, and dissolved carbon dioxide. As a consequence, the project is valid and offers Egypt a good opportunity to take advantage of the microplastics scattered out through its water sources and also to purify water with a lower effort.

Rock Detection Using Ai

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Abstract

Egypt is one of the countries facing tremendous challenges that hinder its development wheel due to the reduction in its industrial base, population growth besides the scientific and technological environment. The industrial base could have a massive impact on society and the environment and profoundly affect economic development. The chosen solution for increasing Egypt's industrial base especially to the Steelworks and power stations, Cement, concrete, and building stones which is an image processing project, that detects the rocks that exist in Egypt's areas and mines like basalt, gabbro, and diorite. By this solution, it will able to reduce human error, use these rocks in the factories for many constructions such as concrete, fibers, and interior building veneers, in addition to solving not just the industrial base, but also the problems of population growth and improving the scientific and technological environment at all. The project had many perspectives of development, and the results are successfully hitting our target. The project achieved the primary design requirement, "An AI prototype." This can be concluded as the prototype whenever it scans for something new, it learns from it and saves this data to later reviewing, not traditional programming, also the accuracy and compatibility" Besides, what was concluded is the pros of the python language used in making the code. Some other languages were used, but python was the most suitable one. Our materials are all eco-friendly and available. In the end, we hope our project passes another successful long ladder in the future as well.

A Review Paper about Alternative Energies

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Abstract:

Egypt's economic development depends on the energy sector. To meet burgeoning energy demand, renewable energy is used as a source of alternative energy and improving its efficiency in the power sector. Targets for renewables have been set by the government to make up 42% of the country's electricity mix by 2035, based on alternative and renewable energy. Various alternative energy sources like nuclear power, solar, wind and biofuels are well known, where biofuels (solid, liquid, gas) seems like one of the best representative sources in terms of usage and the production process. Biofuel is the process whereas the energy of organic materials (renewable biomass) is replaced directly with fossil fuels. Economics plays a crucial role in securing a smooth transition to a biofuel future. The use of biofuels has been gaining popularity over the past few years because of their ability to reduce the big dependence on fossil fuels. The definition of the biofuel, the types of it (ethanol, cellulosic ethanol, biodiesel and etc...), the usage, the importance of biofuel and the challenges that face the biofuel has been explained specifically in many research papers. Algae hold promise as a significant source of biofuel. Algae are an organism that its characteristic is prominent for biofuel production and wastewater remediation. This critical review aims to present the applicability of algae to use it in the future as a source of biofuel in Egypt and the other countries.

Keywords: Fuel, Biofuel, Biomass, Ethanol, Algae

Carbo Alum Filter

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Abstract

Water is a high priority matter for every living organism, but unfortunately, our world is becoming a giant pile of plastic waste, oceans and rivers are polluted by various forms of plastic. Microplastics represent a big threat to human health as they harm the human health, affect environment and affect life cycles and systems. Reasoning physical and chemical toxicity which affects sea animals and human beings led us to think about an efficient way to solve such a challenge by using the most qualified materials to eradicate those microplastics. After following the EDP steps and through research, the idea of our solution had come out. Our solution consists of 3 main layers: aluminum sulfate, cotton and activated carbon, contained in a glass container. The process goes as water with microplastics flows through the layers to end up with water free of microplastics. Our design requirements were applied on our solution which are: having a natural pH and a high efficiency. As the design requirements were applied and the test plan was made carefully, the results were outstanding and the water was cleared up by 97%

Red recycled block

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Abstract

Looking for a better future with high efficiency and an improved economy. Our capstone project has a smart target, it is focused on solving four of Egypt grand challenges which are urban congestion, Arid Areas, pollution and waste development. Our capstone project is a building block which is made of recycled materials. By this way it will help us solve those four challenges in a smart way, as we won't pollute the environment and in the same time we will reduce population. The main process in our capstone is Recycling which is reusing materials and get benefit from it. We have researched a lot for materials that can be applied by the design requirements. As we are asked to make a block that can resist water and carry a specific load. Also, we had to be aware of its cost. After a lot of researches, we have reached the materials that can be confirmed by the design requirements. The recycled materials we have used are iron oxide, construction waste, sawdust and polystyrene, we mixed them all with each other. We have tested the prototype and it succeed to apply the requirements. Our block's maximum load is 130 kg whether it is wet or dry, as it can resist water.

From Useless to Useful

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Abstract

From the most significant challenges that Egypt faces nowadays is improving the use of alternative energy. Egypt uses renewable and nonrenewable energy but that is not enough. New resources of energy are needed for Egypt's future, this semester we are going to solve this challenge by recovering wasted energy and wasted materials into energy. There were a lot of analysis, and it was found that from the most wasted energies that is overlooked daily is heat. It was decided to work on converting wasted heat energy to electricity. the design requirements were chosen, which are the efficiency and the cost. our prototype consists of a Thermoelectric cooler which is a device that turn heat into electricity. its idea is to use the difference between the two sides, the heating and the cooling sides. To increase the efficiency and the product, we used sodium nitrate as the cooling material and the heat sink which conducted the heat. The design requirements were applied on the prototype and a victorious prototype was made.

Block of asphalt crushing

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Abstract

Egypt faces many grand challenges as arid areas, urban congestion, recycling and pollution there are many solutions for these problems as recycling useless materials to get rid of pollution and building arid areas our solution is making prototype of recycling material with specific design requirement, which was carrying heavy load, doesn't absorb water and low in cost after that we search about prior solution that help us in our prototype as 1. Germany does 65% of it is garbage manually, 2. Japan recycling wastes as plastic, paper, PET bottles, aluminum and glass are collected and recycled. 3. Sweden turn their wastes in to energy 4. We also search about different types of block like cement block ,sergeant cement block ,red block ,volcanic block ,mud brick ,compact red block ,sand block ,gypsum block and Emptied block Then, we choose materials of our prototype that related to design requirement and made for it two tests dry and wet test that we made them to know how much masses does our prototype carry and if it is resistance to water or not, then we made results and analysis for our prototype and mention on it negative and positive results for our prototype and mention description for our material and we me measure depth of binding on it and draw graphs for it. Finally, we concluded that our prototype could carry 35 kg and matching to design requirement.

UP DOWN VOLT

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Abstract

Egypt faces a lot of challenges like alternative energies, pollution and health issues. All of these challenges are related to each other, for example the limitation in using the alternative energies lead to pollution then this pollution lead to health issues problems like bronchial asthma.

Our Capstone in this semester talks about using the wasted energies or the wasted materials from any process then change it to another form of energy. Our project is about using the energy produced by the pressure that formed during the ascending and descending of the elevator then a turbine was put in the elevator and a hole was dug to allow the pressure of the air to get to the elevator to turn the turbine to produce kinetic energy then a generator was put to convert this kinetic energy to electricity, we reached to this idea after a lot of searching on the web, references and encyclopedia like Britannica.

Our design requirements low cost or to make our idea affordable with high efficiency by having a great output energy and to make our idea safe to the environment to Egypt's grand challenges, the idea could be applied in the real life not something imaginary also to have high endurance. The results were great that our efficiency is acceptable 25% also the cost wasn't very high 86L.E(affordable), in addition it was safe to the environment. So, our idea is very helpful to Egypt because it generates electricity from wasted energy without producing any material that lead to pollution and it will solve one of the biggest challenges in Egypt.

Multi-level filter

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Abstract

Appropriate understanding the great efforts that have been exerted by the scientists to solve the threats that faces the environment, should now be regarded as an essential requirement according to the modern scientific methods that we follow. Solving and finding solutions for the grand challenges that face Egypt which affect the economically, socially and environmentally status of Egypt is the main aim according to the scientists. Pollution and Recycling are from the most essential grand challenges that must be solved. Removing the municipal wastes such as plastics and microplastics from water is an essential topic in the scientist's research. Microplastics that located in water forms such as salty, fresh and sandy water affect most aspects of life specially in Egypt, as the municipal microplastic in water threatens the economically, socially and environmentally status in Egypt. Our target this semester is to filtrate and purify the water from the municipal microplastic. Our capstone team work on solving these problems and according to the scientific research and prior solutions. We reach a mechanical solution which filtrate and purify from municipal wastes by an efficiency of 90% and 101 joule for every liter. A multi-level filter that consists of three levels each level varies in the properties of filtration. This mechanism is a unique mechanical way of filtration which compared to the results of the real solutions already tried. As the tip of iceberg there is a big story behind this work concluded in this project as will be illustrated later.

The Future Energy Plan

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Abstract

Every year the world's population increases.so, the rate of energy consumption increases, but there is a problem that occurs during the production of energy, as the world relies on fossil fuels as the main source of energy production. Fossil fuel has many disadvantages, such as it is a non-renewable energy source and leads to high levels of CO_2 in the atmosphere that leads to climate change. Therefore, scientists resorted to alternative energy sources and determine what is scientifically possible, environmentally acceptable, and technologically promising. Alternative energy includes nuclear energy and all renewable energy sources such as (solar energy, wind energy, hydropower, ...etc.). Alternative energy has many advantages like it is eco-friendly, it is a renewable energy source and needs little maintenance. But that does not prevent the alternative energy has disadvantages such as fluctuating production, depending on the weather, and the batteries used to store energy are one of the most expensive components in the use of renewable energy. But the level of energy production and the way it is produced varies from country to another. For example, Egypt can generate energy through water, wind, and solar energy, but geothermal energy cannot exist due to the lack of volcanoes in Egypt, in contrast to Japan, where Japan can generate geothermal energy because of the presence of Volcanoes. Previous solutions showed that renewables accounted for 26.2 percent of the world's electricity generation in 2018. This is expected to rise to 45 percent by 2040. Most of the increase is likely to come from solar, wind, and hydropower. In the current period, Egypt intends to increase the supply of electricity generated from renewable sources to 20% by 2022 and 42% by 2035, with wind energy savings of 14%, water power by 2%, and solar energy by 25% by 2035.

The Scanner Doctor

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Abstract

Egypt's problems are limitless in all fields of the country, especially healthcare. Nowadays, Egypt's healthcare is destructed in many points from Hospital crowdness to the unavailability of doctors. These scenes became very popular in Covid-19 pandemic. People are going to the hospitals with large numbers as some have symptoms and need to have a checkup in the hospitals, and sometimes doctors can't afford to see all of them, so they all stand in for their turns. In addition, a lot of time is taken by doctors to diagnose from X-ray scans which leads to late treatment leading to the spread of the disease in the whole body. To solve all these problems, the best solution is a computerized AI doctor to be made, in which doctor tasks are done by a software code by learning from X-ray chest scans of random patients as to have initial knowledge of the features of the scan of each disease. Diseases would be diagnosed by the program from X-ray scans. An accuracy of average 70% was achieved by our google colab model in detecting 5 diseases Viral Pneumonia, Bacterial Pneumonia, pneumothorax, emphysema and Covid-19 and the normal case from chest X-ray scans. This model can be the best solution for doctor's unavailability in systemic regions and to make the diagnosis process much easier and faster as instead of waiting for long time to see your doctor for a specific reason, now any part of the body can be diagnosed quickly.

COVID-19 Detector

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Abstract

Only in the darkness can you see the stars." Said Martin Luther King Jr. Every problem has a solution regardless of its difficulty or complication. Egypt faces a lot of grand challenges like pollution and low use of recycling. Our capstone project this semester revolves around making an AI prototype using machine learning to solve one of Egypt's grand challenges. Nowadays, Egypt faces many obstacles due to the COVID-19 pandemic. As it is known that COVID-19 is an infectious disease, the Egyptian government has taken many decisions that helped stop the spread of this disease, such as schools' closure and replacing it with online sessions. Certainly, it was difficult for the teachers to know if students understand the concepts during online sessions and attentive or not. Consequently, we searched to find a solution that can help teachers get the most benefits of the sessions using an AI application that works as an emotion detector. This application will define students' status after the session and then send feedback to the teacher. According to psychological research in emotions, we focused on seven emotions that are relative to our problem. Python was used as a programming language to write our codes, and we collected our dataset. While making our prototype, the design requirements were achieved. Our design requirement was that our prototype contains AI, and the data demonstrates that the system is learning from the outputs and the inputs. After the prototype was tested, it was found that the design requirements were achieved successfully.

Hurry to Pottery

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Abstract

Globally, all countries around the world suffer from water pollution. Water pollution is a great obstacle that confronts Egypt and hinders its development. Water contamination is an adulteration of water bodies such as lakes and rivers; it represents a huge problem that has many different causes. Egypt faces a rapidly increasing deterioration of its surface and groundwater due to increasing discharges of heavily polluted domestic and industrial pollutants into its waterways. The main problems caused by water pollution are that it is harmful to marine life, health hazard, disrupting the natural food chain and damaging the environment. Water pollution is caused by an important agent which is spreading microplastics in water. Microplastics are microparticles of plastic that threaten the environment in many fields which act as a harmful pollutant. So, our aim is to solve this problem. The most suitable solution for this problem is extracting the microplastics from water using filtration with pottery material. The pottery has a high ability to purify water from microplastics due to its low permeability and porosity with an efficiency of percentage (98%). In this way, the project is able to purify water, make the water available for drinking and reducing the amount of water pollution. Finally, our solution has achieved all design requirements as it has high efficiency and has no effect on water properties.

Medical Bloom Chatbot

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Abstract

Egypt faces a host of socio-economic, political, environmental challenges, and no doubt, public health challenges. Regarding public health challenges, medical misdiagnosis is one of the most severe health care problems that we must consider for a better life in Egypt. A spate of high-profile deaths in Egypt from medical misdiagnosis has highlighted the need for better all-round medical care. Online symptoms diagnosis searching due to lack of knowledge about where people should go to receive care or when do their Hygienic conditions require a visit to the doctor could contribute to the misdiagnosis resulting in a worsening of the patient's medical condition or even death. On the other hand, in the last couple of years, Artificial Intelligence has proved itself in transforming all aspects of life. It is a wide-ranging tool that enables people to rethink how we integrate information, analyze data, and use the resulting insights to improve decision-making. Consequently, constructing AI-powered Chatbot could transform all aspects of public health in Egypt, too, where it could be an effective solution in triaging and guiding patients to receive the appropriate help. Simultaneously, our AI-powered Chatbot is considered a more reliable and accurate alternative to online searches that patients carry out when trying to understand the cause of their symptoms. So, we adopted our medical AI-powered Chatbot to provide patients with all medical data they could ask. Besides, a description of every single illness or disease attached with an official web link that contains information and instructions that the patient should follow. At the end, we did some test plans on our Chatbot, and we concluded that it precisely achieved the determined design requirements where it is suitable for all ages, powered by AI as well as it has proved a high accuracy which was (0.9747).