

IX. Students Research Projects in Relevant SDGs

Students Projects Relevant to SDG 7:

Project name	Summary
1. Natural Fibers	The usage of natural resources will play a leading role in the sustainable development of the cement and concrete industry during this century. Plant-based natural fibers are used more increasingly in construction materials. Despite the low-cost of such environmentally friendly renewable material, it has the ability to enhance the mechanical properties of construction materials. This project presents extensive experiments on the use of plant based natural fibers as reinforcement for cement-based composites, with a particular emphasis upon fiber types; fiber characteristic, and fiber-cement composites performance
2. Solar PV pumps for sustainable irrigation in Egypt	This project represents a comprehensive design of photovoltaic water pumping system powered entirely by solar energy with object of conserving electricity by reducing the usage of grid power and conserving water by reducing water losses. Proposed system is easy to implement and environment friendly solution for irrigation fields as well as requires minimal maintenance and attention and is self-starting.
3. Design and optimization of solar collectors' network for swimming pool heating application	This project presents a general procedure for designing and optimizing the arrangement of solar collectors of swimming pool heating applications using TRNSYS software. The optimal arrangement of the solar collectors for thermal applications requires a merge between thermal and hydraulic objectives. For the thermal side, the working fluid must provide the heat load for the swimming pool at the specified temperature also for the hydraulic side the fluid must flow through the system facing a pressure drop within the specified limits. In this project, the overall arrangement of solar collectors which forms the total collector surface area is named by the (solar collector's network). This network will be practically applied on a swimming pool as a case study for this project. In addition to, an experimental model of a solar heater is constructed to fit the swimming pool.
4. Design, Modeling and performance analysis of solar still	Two identical conventional solar still have been fabricated and will be assembled. For enhancing the freshwater yield, we used some parameters on solar still like a black aluminum sheets fins fixed on a black Basin (steel, 80*50*10 cm, thickness 6 mm). The transparent glass covers of 5mm thickness were placed at an inclination of 30° to the horizontal. Moreover, we used absorbing material like a black dye and sensible heat storage material on different water depth (20mm, 30mm and 40mm). Also, modeling has been carried out aided by some basic and simplified hypotheses, according to overall thermal energy balances on glass, water mass and basin. while taking into consideration an atmospheric condition such as temperatures, humidity, and solar intensity as well as wind speed.
5. Design and optimization of solar collectors' network for swimming pool heating application	This project presents a general procedure for designing and optimizing the arrangement of solar collectors of swimming pool heating applications using TRNSYS software. The optimal arrangement of the solar collectors for thermal applications requires a merge between thermal and hydraulic objectives. For the thermal side, the working fluid must provide the heat load for the swimming pool at the specified temperature also for the hydraulic side the fluid must flow through the system facing a pressure drop within the specified limits. In this project, the overall arrangement of solar collectors which forms the total collector surface area is named by the (solar collector's network). This network

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8. Smart campus	This project is still proceeding in the academic year 2020/2021 and it aims to construct a smart system for the life of students and staff members in university campus. It helps the education process and provides facilities to check attendance. It also allows students to enter the campus and study rooms with a smart card that can also be used for fees payment.

Students Projects Relevant to SDG 9

Project name	Summary
1. Natural Fibers	The usage of natural resources will play a leading role in the sustainable development of the cement and concrete industry during this century. Plant-based natural fibres are used more increasingly in construction materials. Despite the low-cost of such environmentally friendly renewable material, it has the ability to enhance the mechanical properties of construction materials. This project presents extensive experiments on the use of plant based natural fibres as reinforcement for cement-based composites, with a particular emphasis upon fibre types; fibre characteristic, and fibre-cement composites performance
2. Smart campus	This project is still proceeding in the academic year 2020/2021 and it aims to construct a smart system for the life of students and staff members in university campus. It helps the education process and provides facilities to check attendance. It also allows students to enter the campus and study rooms with a smart card that can also be used for fees payment.
3. Smart traffic light	(SDG 11) Make cities and human settlements inclusive, safe, resilient and sustainable

4. Smart campus	This project is still proceeding in the academic year 2020/2021 and it aims to construct a smart system for the life of students and staff members in university campus. It helps the education process and provides facilities to check attendance. It also allows students to enter the campus and study rooms with a smart card that can also be used for fees payment.
5. Design a solar hybrid air conditioning compressor system	Statistics these days say that electricity demand increase in air conditioning system, due to increasing in temperature in the most of countries, so people suffer from high electricity bills. Integrate solar devices or systems to use heat gain from sun to get electricity, and devices that we can use {photovoltaic, solar collector, hybrid system}.The electricity produced can be used to operate compressor that used for compressing the refrigerant in air conditioning system .Three system mentioned above, we should select the best system that give low electricity demand and high efficiency .
6. Solar trackers for hybrid power supply	This project represents a smart power supply by using solar energy as the sources. It reduces the Use of other sources in order to achieve our goal to generate electricity (during day time). The solar tracker device equipped with the project which is absorbs the ultraviolet (UV) from the sun in maximum condition. The tracker operates with single axis rotation where it can be rotating horizontal. This circuit is activated when light dependent resistor (LDR) detecting the sunshine where four sensors are placed at north and south position.
7. Public Transportation System	This project was done in the academic year 2019/2020 and its main goal was to design a smart system for public transport. The system uses GPS and GSM system to determine the exact location of vehicle and collect data to provide people with the best choice of public transport to use. The system saves time and money and helps in the concept of building smart cities and includes several industrial innovations. (SDG 11) Make cities and human settlements inclusive, safe, resilient and sustainable (SDG 9) Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.
8. Brain Controlled Smart Wheelchair Based on Mental Task Classification	This project was done in the academic year 2019/2020. The main objective of the project is to help people that were born with the inability to move or had experienced accidents, which led to their loss of this ability. Such situation negatively affected their lives and made them in a permanent need for those who take care of them. The project used technologies to allow these people to control wheel chair via their brain function. (SDG 9) Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation. (SDG 3) Ensure healthy lives and promote well-being for all at all ages
9. Smart campus	This project is still proceeding in the academic year 2020/2021 and it aims to construct a smart system for the life of students and staff members in university campus. It helps the education process and provides facilities to check attendance. It also allows students to enter the campus and study rooms with a smart card that can also be used for fees payment.

Projects of students Relevant to SDG 10:

Project name	Summary
1. Brain Controlled Smart Wheelchair Based on Mental Task Classification	This project was done in the academic year 2019/2020. The main objective of the project is to help people that were born with the inability to move or had experienced accidents, which led to their loss of this ability. Such situation negatively affected their lives and made them in a permanent need for those

	<p>who take care of them. The project used technologies to allow these people to control wheel chair via their brain function.</p> <p>(SDG 9) Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.</p> <p>(SDG 3) Ensure healthy lives and promote well-being for all at all ages</p>
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Projects of students Relevant to SDG 11:

Project name	Summary
1. Water and wastewater	<p>Wastewater treatment is a process, which is being done on the wastewater to change its quality for drinking or other suitable purposes. Wastewater treatment takes place in wastewater treatment plants, which should be designed under different circumstances. The project contains:</p> <ol style="list-style-type: none"> 1- Design intake sum pump unit. 2- Design sedimentation tank. 3- Design filtration tank. 4- Design sludge treatment process. 5- Take a case study in a new compound city.
2. Electrical design of residential compound area with management of distributed generation and optimum power quality performance by load demand side	<p>The aim of this power system project is to help the student in his final B.E. graduation project to apply what he has learned in the field of power systems under graduate courses. The materials included in the following requirements of the design project shall be calculated and prepared in the same structure of the typical professional jobs of electrical engineering works according to the roles of IEC standard codes.</p>
3. IoT approach for sustainable green campus	<p>This project proposes a complete layout for a smart green campus using IoT as a core technology. This project highlights several main features of green campus such as energy saving and efficiency water consumption. The communication technologies that will be implemented in the project layout will be RFID, Bluetooth and cloud computing. Moreover, some prototypes will be designed to validate the proposed layout</p>
4. Design a solar hybrid air conditioning compressor system	<p>Statistics these days say that electricity demand increase in air conditioning system, due to increasing in temperature in the most of countries, so people suffer from high electricity bills. Integrate solar devices or systems to use heat gain from sun to get electricity, and devices that we can use {photovoltaic, solar collector, hybrid system}.The electricity produced can be used to operate compressor that used for compressing the refrigerant in air conditioning system .Three system mentioned above, we should select the best system that give low electricity demand and high efficiency .</p>
5. Solar trackers for hybrid power supply	<p>This project represents a smart power supply by using solar energy as the sources. It reduces the Use of other sources in order to achieve our goal to generate electricity (during day time). The solar tracker device equipped with the project which is absorbs the ultraviolet (UV) from the sun in maximum condition.</p> <p>The tracker operates with single axis rotation where it can be rotating horizontal. This circuit is activated when light dependent resistor (LDR) detecting the sunshine where four sensors are placed at north and south position.</p>

6. Smart traffic light	(SDG 11) Make cities and human settlements inclusive, safe, resilient and sustainable
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Projects of students Relevant to SDG 12:

Project name	Summary
1. Recycling of fabric scrap	The importance of recycling textiles is increasingly being recognized. The purpose. Once in landfills, natural fibers can take hundreds of years to decompose. They may release methane and CO ₂ gas into the atmosphere. Additionally, synthetic textiles are designed not to decompose. In the landfill, they may release toxic substances into groundwater and surrounding soil. The synthetic fiber raw materials totally imported from outside as polyester and nylon and the annual consumption is 440 thousand tons and the recycling processes are not applicable, so the new technology for recycling this scrap is value added materials

Projects of students Relevant to SDG 13:

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1. Recycling of fabric scrap	The importance of recycling textiles is increasingly being recognized. The purpose. Once in landfills, natural fibers can take hundreds of years to decompose. They may release methane and CO ₂ gas into the atmosphere. Additionally, synthetic textiles are designed not to decompose. In the landfill, they may release toxic substances into groundwater and surrounding soil. The synthetic fiber raw materials totally imported from outside as polyester and nylon and the annual consumption is 440 thousand tons and the recycling processes are not applicable, so the new technology for recycling this scrap is value added materials