SDP Group Teams members and advisors

SDP code	SDP title	Students Names	Advisor
ENRG-2201	Design and Fabrication of Optimized Parabolic Trough Concentrator for Advanced Solar Self-Tracking Application	1. Kamal Mohamed Nayel 2. Badr Ahmed Al-Qahtani 3. Ahmed Khaled Al-Hanen 4. Monther Abdullah Al-Khalaf	Dr. Nassir
ENRG-2202	Autonomous Aquatic Vehicle Powered via Solar System & RC Controller	1. Hussain Ameen Al-Nasser 2. Ali Sultan Al-Supaie 3. Raed Mohammed Almubarrazi 4. Ayman Mohammed Abu Al-Rahi 5. Basil Abdullah Al-Ghamdi	Dr. Saleem
ENRG-2203	Design and optimization of innovative passive photovoltaic concentrator based Axially Graded Index LEns	1. Hasan Abdulrahman Al-Katheer 2. Bader Fahad Al-Otaibi 3. Abdulrahman Soufyan Al-Eyadah 4. Ibrahim Saleh Al-Qahtani	Dr. Taher
ENRG-2204	Modelling and Experimental Implementation of a Photovoltaic Thermal Integrated Air-Gap Membrane Desalination System	1. Khaled Abdullah Al-Baker 2. Hassan Zaki Al-Homaid 3. Sattam Malhaa Al-Harbi 4. Almustafa Ahmed Shocair	Dr. Sajid
ENRG-2205	Solar-Powered Atmospheric Water Generator System for Agricultural applications	1. Emad Khalid Al-Youbi 2. Mazen Sami Nouman 3. Khaled Abdullah Al-Ruwaished 4. Mostafa Alawi Ba'Aqeil	Dr. Nassir
ENRG-2206	Design, fabricate, and test enhanced-performance steam iron press machine for commercial laundry shops	1. Abdullah Bader Al-Qateefi 2. Nasser Youssef Al-Ismail 3. Mohammed Abed Al-Matar 4. Abdullah Emad Bukhamsin	Dr. Fahad
ENRG-2207	Design, Build, And Test A HAWT Operated Stand-Alone LED Street Light.	1. Fakhr Al Deen Taleb 2. Nawaf Nazeeh Al-Mustafa 3. Hamdan Salah Al-Ghamdi 4. Ammar Abdullah Al-Qahtani	Dr. Farooq
ENRG-2208	Enhancement of Thermoelectric Generator Heat Sink Design	1. Farooq Wadee Al-Gehelani 2. Saad Hatem Al-Bouqami 3. Bader Abdullah Al-Qahtani **4.** Mubarak Hamad Al-Khaldi	Dr. Amr
ENRG-2209	Design of Battery management system for Renewable applications	1. Abdulrahim Ibrahim Al-Hashim 2. Salman Mohammed Al-Maatham 3. Osama Hamad Al-Hamad **4.** Abdulaziz Nabil Al-Naim	Dr. Nagmeldeen

ENRG-2201

Design and Fabrication of Optimized Parabolic Trough Concentrator for Advanced Solar Self-Tracking Application

Advisor: Dr. Nasir Hariri, Tel: 0568561403, email: nghariri@iau.edu.sa

Abstract: One of the modern methods to enhance the efficiency of photovoltaic (PV) systems is by implementing a solar tracking mechanism in order to redirect PV modules toward the sun throughout the day. However, the use of solar trackers increases the electrical consumption of the system, and therefore, hinders its net generated energy. In this study, a novel self-tracking solar-driven PV system is proposed. The smart solar-driven thermomechanical actuator takes advantage of a solar heat collector (SHC) device, in the form of a parabolic trough solar concentrator (PTC), and smart shape memory alloy (SMA) to produce effective mechanical energy from sun rays towards solar tracking applications. A thermal-optical analysis is presented to evaluate the performance of the solar concentrator for the simulated weather condition of Dammam city, Saudi Arabia. The numerical results of the thermal and optical analyses show the promising feasibility of the proposed system in which SMA springs with an activation temperature between 31.09 °C and 45.15°C can be utilized for the self-tracking PV system. The work presented adds to the body of knowledge an advanced SMA-based SHC device for self and solar-based actuation systems that enables further expansions within modern and advanced solar thermal applications.

No.	Task	Week Number									
		1	2	3	4	5	6	7	8	9	10
1	Brain Storming and Project Title Selection	K,B,A,M									
2	Research Proposal		K,B,A,M	K,B,A,M							
3	Planning and Gantt Chart			K,B,A							
4	Litreture Review			K,B,A	B,A,M	B,A,M					
5	Synchronization Study			K,B,A	K						
6	Development of the Methodology				K,B,A,M	K,B,A,M					
7	Development of the Testing Platform				K	K					
8	Complete CAD Design					K	K				
9	Fabrication and Manufacturing					K	K,B,A,M	K,B,A,M			
10	Preliminary Test and Results							K,B,A,M	B,A,M		
11	Data Processing and Anaylsis								K	K	
12	Report and Persentaion Prepration			K,B,A,M	K,B,A,M	K,B,A,M	K,B,A,M	K,B,A,M	K,B,A,M	K,B,A,M	K,B,A,M

ENRG-2202

Autonomous Aquatic Vehicle Powered via Solar System & RC Controller

Advisor: Dr. Muhammed Saleem, Office , Tel:+966583459975, email: mssharif@iau.edu.sa

Brief-Abstract:

Engineers are always looking for innovative solutions to various challenges. In this regard, the project will explore numerous approaches as we design a robotic boat that can be move using remote controller to be used in various applications such as under water ground survey, security surveillance, marine life exploration and data collection. The project will include solar system unit to produce the power required of the boat with making an enhancement of different sensors using a control system unit to control the boat movement and balance over the sea surface as it attached with radial camera. The camera and sensors will allow the unmanned marine vehicle to perform various task and reduce the cost and risk involved with maritime safety, survey and data collection. And enhancement areas will be identified.

SDPI Scheduling:

Task	Duration (wks)	wk1	wk2	wk3	wk4	wk5	wk6	wk7	wk8	wk9	wk10	wk11	wk12	wk13
1. SDP-I Documentation	7													
2. Literature review	4													
3. Design	4													
4. Simulation	6													
5. SDP-I drafting Report	2													
6. Presentation preparation	2													

ENRG-2203

Design and optimization of innovative passive photovoltaic concentrator based Axially Graded Index LEns

Advisor: Dr. Taher, Office 3606, Tel: 0583757073, email: tsmaatallah@iau.edu.sa

Brief-Abstract:

The current project aims to design, assemble, and test an enhanced v-trough photovoltaic panel. The sub-unit assembly of the system design will be first designed, then manufactured using the 3D printer. After that, the optical performance of the proposed design will be tested using the sun simulator in the Renewable Energy Laboratory at the Department of Mechanical and Energy Engineering. The whole assembly (optical, mechanical, and electrical structure) will be built-in using the locally available features and facilities of the workshop & FABLAB house. The prototyped enhanced v-trough system will be installed, tested, and compared to the existing flat-plate si-PV panels.

SDPI Scheduling:

Task	Duration (wks)	wk1	wk2	wk3	wk4	wk5	wk6	wk7	wk8	wk9	wk10	wk11	wk12	wk13
1. SDP-I Documentation	8													
2. Literature review	4													
3. Design	4													
4. Simulation	7													
5. SDP-I drafting Report	2													
6. Presentation preparation	2													

ENRG-2204

Modelling and Experimental Implementation of a Photovoltaic Thermal Integrated Air-Gap Membrane Desalination System

Advisor: Dr. Sajid Ali, Office 3604, Tel: 0582720536, email: sakzada@iau.edu.sa

Brief-Abstract:

Membrane desalination techniques is an affordable solution to the problem of water scarcity in many parts of the world. In this study, a novel design of a Membrane Desalination (MD) integrated with a PV solar panel is proposed. In the proposed design, solar energy will be utilized both as a pre-heating source for salination solution as well as a power source to operate the unit. Numerical modeling of the proposed design will be performed before the fabrication of a prototype. The effect of the process parameter and the ambient conditions on the overall performance of the system will studied both theoretically and experimentally.

SDPI Scheduling:

Task	Duration (wks)	wk1	wk2	wk3	wk4	wk5	wk6	wk7	wk8	wk9	wk10	wk11
1. SDP-I Documentation	7											
2. Literature review	4											
3. Design	4											
4. Simulation	6											
5. SDP-I drafting Report	2											
6. Presentation preparation	2											

ENRG-2205

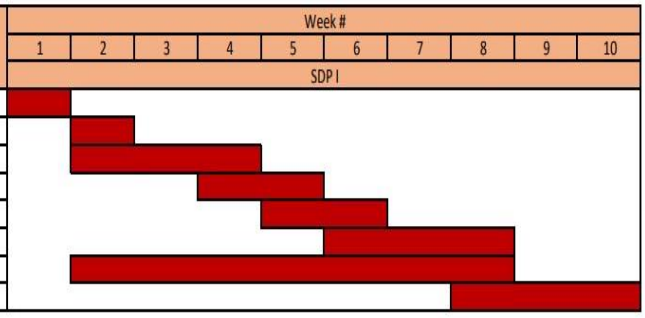
Solar-Powered Atmospheric Water Generator System for Agricultural applications

Advisor: Dr. Nasir Hariri, Tel: 0568561403, email: nghariri@iau.edu.sa

ABSTRACT:

The availability of water is necessary and has always been a concern around the globe. While providing water is an indication of the sustainable development of the human community. Therefore, the shortage will cause a threat not only to humans but also to agriculture, and hence there is an urgent need to develop sustainable technology in this field. Atmospheric water generation (AWG) is a device that takes advantage of the humidity in the air to generate water by condensing the humid air; furthermore, the key for the AWG to provide water is humidity. The proposed solution is portable solar-driven atmospheric water generation that takes advantage of the humid air to generate water that could potentially be used in rural areas. The system will be experimentally tested under Saudi Arabia weather conditions. However, Saudi Arabia is characterized by a desert climate, according to the General Authority for Statistics the cities on the coast, such as Dammam, Jeddah, and Jizan show high records in terms of relative humidity of 42%, 53%, and 67% respectively. This project aims to provide sustainable portable solar-driven AWG that works as an aggregation for the water in the humid air, which will provide further expansion and techniques in the water supplement field.

#	Task	Task Duration (weeks)
1	Brainstorm and ideas proposal	1
2	Select the project and Write the proposal	1
3	Literature review	3
4	Development of the methodology	2
5	Mechanical design	2
6	CAD Design and Simulation	2
7	Documentation	7
8	Report and Presentation preperation	3



ENRG-2206

Design, fabricate, and test enhanced-performance steam iron press machine for commercial laundry shops

Advisor: Dr. Fahad Al-Amri, Office 3609, Tel: 0504955412, email: fgalamri@iau.edu.sa

Brief-Abstract:

The steam ironing machines available on the market consist of heated ironing boards with multi holes to deliver steam to increase its effectiveness on the clothes and remove wrinkles. However, some of the steam escape into the environment, leading to an uncomfortable place for laborers and a heavier electric load by air conditioning. In this project, a new steam ironing machine will be designed and fabricated where extended surfaces are added to the steam press's upper and lower heating plates to prevent the escape of the steam to the surrounding environment.

SDPI Scheduling:

Task	Duration (wks)	wk1	wk2	wk3	wk4	wk5	wk6	wk7	wk8	wk9	wk10	wk11	wk12	wk13
1. SDP-I Documentation	7													
2. Literature review	4													
3. Design	4													
4. Fabrication and Experiments	6													
5. SDP-I drafting Report	2													
6. Presentation preparation	2													

ENRG-2207

Design, Build, And Test A HAWT Operated Stand-Alone LED Street Light.

Advisor: Dr. Farooq Saeed, Office 3603, Tel: 0507984878, email: fsaeed@iau.edu.sa

Brief-Abstract:

The proposed project aims to design, build, and test a horizontal axis wind turbine (HAWT) to power street lights, with the help of wind energy, through wind turbines. The system design will focus on a small-scale wind turbine that will produce electricity to power a typical LED street light. The HAWT blades will be specifically designed based on local wind resource, fabricated using 3D printer, and tested for performance evaluation in the Department of Mechanical and Energy Engineering wind turbine trainer facility. The design of the blades and the turbine will be governed by the RPM of the generator and the electric powered needed to run the LED street light. The complete system will be built using locally available off-the-shelf components as much as possible and fabricated using the facilities of College of Engineering Mechanical workshop & FABLAB. The final system will be installed and tested as a proof of concept.

ENRG-2208

Enhancement of Thermoelectric Generator Heat Sink Design

Advisor: Dr. Amro Owes, Office 3605, email: aowes@iau.edu.sa

Brief-Abstract:

Nowadays, the scientists are focusing on improving the production of energy that is based on electrical power generators. Thermoelectric generators (TEG) have showed their ability to directly convert the thermal energy into electrical energy via the so called Seebeck effect. Thermoelectric generators could be used in many applications, such as electronic devices, solar energy systems, health monitoring and tracking systems, aerospace and waste heat recovery from industry. The main objective of this project is to design, construct and evaluate the optimum heat sink design for thermoelectric generator module to improve its efficiency and increase its power productivity. Numerical CFD for the different heat sink designs of thermoelectric generator system will be presented and discussed. After obtaining the optimum design of the heat sink, a TEG prototype system will be fabricated and tested in a laboratory environment. The electrical power generated by the TEG system is measured to determine the relationship between the power output and temperature different between hot and cold surfaces. The simulation and experimental work findings will be conducted to analyze the data for predicting the behavior of thermoelectric module and to determine the highest TEG system performance.

SDPI Scheduling (1st Trimester):

Task	Duration (wks)	wk1	wk2	wk3	wk4	wk5	wk6	wk7	wk8	wk9	wk10	wk11	wk12	wk13
1. SDP-I Documentation	7													
2. Literature review	4													
3. Design	4													
4. Simulation	6													
5. SDP-I drafting Report	2													
6. Presentation preparation	2													

ENRG-2209

Design of Battery management system for Renewable applications

Advisor: Dr. Nagmeldeen A M Hassanain, office: 3653, E-mail: nahassanain@iau.edu.sa

Brief-Abstract:

Battery management system (BMS) plays an important role for modern battery-powered application such as Electric vehicles, portable electronic equipment, and storage for renewable energy sources. It also increases the life cycle of the battery and battery state and efficiency.

Battery banks are often faced with the challenge of charge imbalance due to the disparities that occur in the operating characteristics of the batteries that constitute a bank. When a battery bank with charge imbalance is repeatedly used in applications without an effective battery management system (BMS) through active charge equalization, there could be an early degradation, loss of efficiency and reduction of service life of the entire batteries in the bank.

In this project, an effective BMS will be designed and simulated using Matlab/Simulink. The prototype of BMS will be fabricated and tested experimentally.

Task	Duration (wks)	wk1	wk2	wk3	wk4	wk5	wk6	wk7	wk8	wk9	wk10	wk11	wk12
1. SDP-I Docume58766ntation	7												
2. Literature review	4												
3. Simulation	4												
4. Design	6												
5. SDP-I drafting Report	2												
6. Presentation preparation	2												