وزارة التعليم
Ministry of Education
043

المملكة العربية السعودية
Kingdom of Saudi Arabia

IMAM ABDULRAHMAN BIN FAISAL UNIVERSITY
جامعة الإمام عبدالرحمن بن فيصل

College of Engineering | كلية الهندسة

Table 1. List of SDP team members and advisors

SDP code	SDP title	Students Names	Advisor
ENRG-2001	Design a heat extraction system for High Concentration Photovoltaic (HCPV) driving a water desalination system.	1. Ahmed Taha Okasha 2. Anas Ahmed 3. Abdullah Ghamdi	Dr. Fahad
ENRG-2002	Modular solar panel design and development	1. Hassan abu shoumi 2. Feras AlDuhaim 3. Fahad walid aldossary	Dr. Saleem
ENRG-2003	Portable Autonomous Desalination Unit	1. MOHAMMED HANI ALWAHEED 2. Faisal ali alzahrani 3. Abdallah omar almalki	Dr. Farooq
ENRG-2004	Design of fuzzy logic control-based MPPT charge controller for stand-alone PV system	1. Mohammed Al-Talib 2. Ali Jaffer AL Qatari 3. Ali Al-Ghanim	Dr. Nagmeldeen
ENRG-2005	Automation and performance evaluation of a split air conditioner via Android smart phone	1. Abdulilah Almahdi 2. Abdulmohsen Olaiwat 3. Nasser Al-Ibrahim	Dr. Amro
ENRG-2006	Design a cogeneration system using High Concentration Photovoltaic (HCPV) for power generation and desalination.	1. Ghaith Alfalah 2. Ali Al-Matar 3. Abdulrahman	Dr. Taher
ENRG-2007	DESIGN AND IMPLEMENTATION OF A TUBULAR CLAY MEMBRANE FOR USE IN WATER DESALINATION SYSTEM	1. Hassan Al-Safwan 2. Ihsan Al-Hamoud	Dr. Sajid
ENRG-2008	Experimental Investigation of different cleaning methods for Dust Accumulation on PV panel Using an autonomous Robot	1. Abdulrahman Ashraf Ashour. 2. Saleem Khalid AlAwad 3. Ali Mohammed AlQarni	Dr. Nasir
ENRG-2009	Smart cooling Method of PV Module using Shape Memory Alloy	1. Zaid Al khateeb Ali 2. Nawaf Anwar 3. Mohammad Ibrahim Alosayl	Dr. Nasir

وزارة التعليم
Ministry of Education
043

جامعة الإمام عبدالرحمن بن فيصل
IMAM ABDULRAHMAN BIN FAISAL UNIVERSITY

المملكة العربية السعودية
Kingdom of Saudi Arabia

College of Engineering | كلية الهندسة

ENRG-2001

Design a heat extraction system for High Concentration Photovoltaic (HCPV) driving a water desalination system

Advisor: Dr. Fahad Gallab Al-Amri

Brief-Abstract:

In the literature, various passive and active cooling setups have been employed to thermally manage the operation of the single-cell and/or densely array High Concentration Photovoltaic system (HCPV). In the current project, a new design of cooling mechanism is developed and designed based on an integrated heat pipes at the bottom surface of a Copper substrate behind the cell surface area. The proposed design, that had never been applied, will be numerically simulated and experimentally tested under indoor and outdoor conditions. The amount of heat that has been effectively extracted away from the solar cell domain will be used for driving a water desalination system based on clay membrane.

SDPI Scheduling:

Task	Duration (wks)	wk1	wk2	wk3	wk4	wk5	wk6	wk7	wk8	wk9	wk10	wk11	wk12	wk13	wk14
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												▓	▓	

IMAM ABDULRAHMAN BIN FAISAL UNIVERSITY

College of Engineering | كلية الهندسة

ENRG-2002

Modular solar panel design and development

Advisor: Dr. Saleem Mahmood

Brief-Abstract:

The objective of the senior design project is to develop a modular solar panel design. The past SDP groups successfully developed the prototype. The objective of this group would be to do large scale testing and develop a cleaning mechanism along with studying the economic feasibility of the proposed modular design. The students will investigate the durability testing, thermal and environmental performance and the economic impact of reducing e-waste generated by the non-recycling of solar panels. Furthermore, students will also develop understanding of energy mix and policies needed for developing renewable growth.

وزارة التعليم
Ministry of Education
043

جامعة الإمام عبدالرحمن بن فيصل
IMAM ABDULRAHMAN BIN FAISAL UNIVERSITY

المملكة العربية السعودية
Kingdom of Saudi Arabia

College of Engineering | كلية الهندسة

ENRG-2003

Portable Autonomous Desalination Unit

Advisor: Dr. Farooq Saeed

Brief-Abstract:

A portable autonomous desalination unit powered by a standard 240-Watt Photovoltaic panel is desired. The unit should be able to draw water from available source (sea water, brackish water, pond or lake or from a well), filter and process it for drinking purposes using a small-scale desalination unit powered by solar energy. The unit should be portable and use locally available off-the-shelf components such as water pump, plumbing, water filters, etc., for keeping the system price down. The design should be based on any applicable Engineering Standards. The usefulness of such a unit is in its portability to remote and coastal areas and localities or where access to clean water is limited as well as provide emergency water in famine or drought-stricken areas.

وزارة التعليم
Ministry of Education
043

جامعة الإمام عبدالرحمن بن فيصل
IMAM ABDULRAHMAN BIN FAISAL UNIVERSITY

المملكة العربية السعودية
Kingdom of Saudi Arabia

College of Engineering | كلية الهندسة

ENRG-2004

Design of fuzzy logic control-based MPPT charge controller for stand-alone PV system

Advisor: Dr. Nagmeldeen Hassanian

Brief-Abstract:

Solar cells have the major drawbacks of low photo-conversion efficiency. The current-voltage characteristics of the solar cells depend on solar insolation level and temperature, which leads to the variation of the maximum power point (MPP). Stand-alone PV system usually consists of PV modules and batteries, which are connected through charge controllers. To improve PV system efficiency, and increase the lifetime of the battery, charge controller with maximum power point tracker (MPPT) will be designed for harvesting the maximum power available from the PV system under given insolation and temperature conditions. Fuzzy logic control is one of the MPPT techniques, which gives excellent results.

In this project, a maximum power point tracker will be designed using fuzzy logic as controller. The system consists of stand-alone photovoltaic solar module connected to a DC-DC converter and lead acid batter.

The mathematical model of the system with fuzzy logic control will be developed and modelled using Matlab/ Simulink software.

The system will be designed and implemented using Arduino uno.

ENRG-2005

Automation and performance evaluation of a split air conditioner via Android smart phone

Advisor: Dr. Amro Aowes

Brief-Abstract:

Nowadays, the smart phone has a capability of communicating with most electronics equipment. Therefore, the main objective of this project is to control a split air conditioner and measuring its performance by using android application. The air conditioning unit is controlled based on Bluetooth input signal received from the android smartphone. The control system includes three main components: a Microcontroller, a Bluetooth module for signal transfer, and a Smartphone with the Android application to control the appliances. The main aspect of the control system is the sensory system that collects the different parameters which are used to evaluate the performance of the conditioner such as: temperature, humidity, pressure, energy consumption, % of CO_2, air quality. The corresponding data from various sensors will be sent to the microcontroller. The construction of the prototype of this control model can be achieved as: select the components and software, design the electronic circuit, connect the sensors to the microcontroller board, program the microcontroller, program the mobile, integrating the Bluetooth module with the microcontroller, test and debug the application.

This kind of systems provides a comfortable and smart climate as well as more efficient power management.

وزارة التعليم
Ministry of Education
043

جامعة الإمام عبدالرحمن بن فيصل
IMAM ABDULRAHMAN BIN FAISAL UNIVERSITY

المملكة العربية السعودية
Kingdom of Saudi Arabia

College of Engineering | كلية الهندسة

ENRG-2006

Design a cogeneration system using High Concentration Photovoltaic (HCPV) for power generation and desalination

Advisor: Dr. Taher Maatallah

Brief-Abstract:

The cogenerated energy fluxes produced by a High Concentration Photovoltaic system (HCPV) cannot only promote for higher effective optical Concentration Ratios (CRs), but also, improve the exegetic efficiency of the HCPV. In the current work, a novel design of a cooling mechanism for a cogeneration HCPV system is developed. The cooling setup is based on an immersed heat pipes in a stagnant water embedded in a copper millimiter-scale heat sink behind a Multi-Junction Solar cell (MJSC) under High CRs.

SDPI Scheduling:

Task	Duration (wks)	wk1	wk2	wk3	wk4	wk5	wk6	wk7	wk8	wk9	wk10	wk11	wk12	wk13	wk14
7. SDP-I Documentation	8		█	█	█	█	█	█	█	█					
8. Literature review	4	█	█	█	█										
9. Design	4			█	█	█	█								
10. Simulation	7					█	█	█	█	█	█	█			
11. SDP-I drafting Report	2											█	█		
12. Presentation preparation	2												█	█	

وزارة التعليم
Ministry of Education
043

جامعة الإمام عبدالرحمن بن فيصل
IMAM ABDULRAHMAN BIN FAISAL UNIVERSITY

المملكة العربية السعودية
Kingdom of Saudi Arabia

College of Engineering | كلية الهندسة

ENRG-2007

DESIGN AND IMPLEMENTATION OF A TUBULAR CLAY MEMBRANE FOR USE IN WATER DESALINATION SYSTEM

Advisor: Dr. Sajid Khan

Brief-Abstract:

Ceramic membrane has the advantage of longer life and higher mechanical strength over the polymeric membrane. One of the limitations in utilizing the ceramic membrane in MD processes is the fact that they are hydrophilic in nature. In the current SDP, it has been proposed to design a tubular clay membrane for saline water desalination by imparting hydrophobicity through grafting of suitable polymer. Before imparting hydrophobicity, tubular membrane will be manufacture by either slip casting method or injection molding. The membrane will be applied in saline water desalination using airgap membrane distillation (AGMD) process. AGMD setup will be designed and established for this purpose.

Tasks:

Task 1: Literature Review (Membrane desalination techniques, Flat vs Tubular membrane, Tubular clay membrane manufacturing methods)

Task 2: Membrane Design (Optimum length, Diameter, Thickness)

Task 3: Membrane Manufacturing (Design & manufacturing of mold, Slip casting or injection molding)

Task 4: Designing & Establishing of AGMD Setup

Task 5: Experiments

Task 6: Numerical Simulations (If possible)

Task 7: Writeup

وزارة التعليم
Ministry of Education
043

جامعة الإمام عبدالرحمن بن فيصل
IMAM ABDULRAHMAN BIN FAISAL UNIVERSITY

المملكة العربية السعودية
Kingdom of Saudi Arabia

College of Engineering | كلية الهندسة

ENRG-2008

Design and development of a smart cooling system for a photovoltaic panel using smart wire

Advisor: Dr. Nassir Hariri

Brief-Abstract:

This research project will explore the feasibility of implementing an innovative design for a smart cooling system of a PV panel using the integration of a smart material for the actuation mechanism. The study will focus in designing and experimentally fabricating the introduced actuation mechanism with different air-based and water-based cooling methods. Assessments to the electrical performance of developed cooling methods will be investigated to highlight the improved efficiency gained by the developed systems. The proposed approach in this study will highlight the effectiveness of the developed system in the potential improvement for the power generation of PV panel.

وزارة التعليم
Ministry of Education
043

جامعة الإمام عبدالرحمن بن فيصل
IMAM ABDULRAHMAN BIN FAISAL UNIVERSITY

المملكة العربية السعودية
Kingdom of Saudi Arabia

College of Engineering | كلية الهندسة

ENRG-2009

Design and experimental development of a testing platform for a performance evaluation of a smart shape memory alloy material as a micro-actuator for innovative PV technologies

Advisor: Dr. Nassir Hariri

Brief-Abstract:

This project will examine the ability of a smart shape memory alloy to be utilized as an actuation source specifically targeting actuation mechanisms for various integrations with innovative PV technologies. The research project involves designing, fabricating, and experimentally developing a testbed for the performance evaluation and characterization study of the smart shape memory alloy as a reliable and accurate actuation source. The study will conduct force, position, and thermal analyses for the developed actuator design to evaluate its capability for numerous integrations with PV technologies such as cooling, cleaning, and hot-spot detection.

وزارة التعليم
Ministry of Education
043

جامعة الإمام عبدالرحمن بن فيصل
IMAM ABDULRAHMAN BIN FAISAL UNIVERSITY

المملكة العربية السعودية
Kingdom of Saudi Arabia

College of Engineering | كلية الهندسة

Schedule of Senior Design Projects I presentations

SDP code	SDP title	Students Names	Advisor	Jury members	Avenue/ Date/Hour
ENRG-2001	Design a heat extraction system for High Concentration Photovoltaic (HCPV) driving a water desalination system.	1. Ahmed Taha Okasha 2. Anas Ahmed 3. Abdullah Ghamdi	Dr. G. Fahad	1. Chair: Dr. S., Umar 2. Dr. M.S., Taher 3. Dr. T., Abdrabalnabi (GREE)	Energy department Office meeting room /December 27/3:00 PM
ENRG-2002	Macro Energy Management Technique to Lower the Peak Power Supply for Eastern Region of Kingdom of Saudi Arabia	1. Hassan abu shoumi 2. Feras AlDuhaim 3. Fahad walid aldossary	Dr. M. Saleem	1. Chair: Dr. K., Sajid 2. Dr. S. Umar 3. Dr. Zaheer (IAU)	Energy department Office meeting room /December 24/ 10:00 AM
ENRG-2003	Solar-Powered Radiation-Augmented Portable Desalination System	1. MOHAMMED ALWAHEED 2. Faisal ali alzahrani 3. Abdallah omar almalki	Dr. S. Farooq	1. Chair: Dr. S., Umar 2. Dr. M.S., Taher 3. Eng. F.K., Asem (Kayen Solar)	Energy department Office meeting room /December 27/ 11-00 AM
ENRG-2004	Design of fuzzy logic control-based MPPT charge controller for stand-alone PV system	1. Mohammed Al-Talib 2. Ali Jaffer AL Qatari 3. Ali Al-Ghanim	Dr. H. Nagm	1. Chair: A., Amro 2. Dr. H., Nassir 3. Dr. J., Ibraheem (IAU)	Energy department Office meeting room /December 24/12:00 AM
ENRG-2005	Automation and performance evaluation of a split air conditioner via Android smart phone	1. Abdulilah Almahdi 2. Abdulmohsen Olaiwat 3. Nasser Al-Ibrahim	Dr. A. Amro	1. Chair: Dr. H., Nagm 2. Dr. H., Nassir 3. Dr. G., Tarek (IAU)	Energy department Office meeting room /December 24/11:00 AM
ENRG-2006	Design a cogeneration system using High Concentration Photovoltaic (HCPV) for power generation and desalination.	1. Ghaith Alfalah 2. Ali Al-Matar 3. Abdulrahman	Dr. MS. Taher	1. Chair: Dr. S., Farooq 2. Dr. H., Nagm 3. Dr. Z., Gaydaa (PMU)	Energy department Office meeting room /December 27/04-00 PM-
ENRG-2007	DESIGN AND IMPLEMENTATION OF A TUBULAR CLAY MEMBRANE FOR USE IN WATER DESALINATION SYSTEM	1. Hassan Al-Safwan 2. Ihsan Al-Hamoud	Dr. K. Sajid	1. Chair: Dr. A.G., Fahad 2. Dr. S., Umar 3. Dr. Ihssan (KFUPM)	Energy department Office meeting room /December 27/2:00 PM
ENRG-2008	Experimental Investigation of different cleaning methods for Dust Accumulation on PV panel Using an autonomous Robot	1. Abdulrahman Ashraf Ashour 2. Saleem Khalid AlAwad 3. Ali Mohammed AlQarni	Dr. H. Nassir	1. Chair: Dr. Q., Amro 2. Dr. H., Nagm 3. Dr. Z., Saleh (IAU)	Energy department Office meeting room /December 24/5:00 PM
ENRG-2009	Smart cooling Method of PV Module using Shape Memory Alloy	1. Zaid Al khateeb Ali 2. Nawaf Anwar 3. Mohammad Ibrahim Alosayl	Dr. H. Nassir	1. Chair: Dr. H., Nagm 2. Dr. Q., Amro. 3. Dr. A., Hakeem (IAU)	Energy department Office meeting room /December 24/4:00 PM

وزارة التعليم
Ministry of Education
043

جامعة الإمام عبدالرحمن بن فيصل
IMAM ABDULRAHMAN BIN FAISAL UNIVERSITY

المملكة العربية السعودية
Kingdom of Saudi Arabia

College of Engineering | كلية الهندسة

Schedule of SDP- II defense Date and Avenue

SDP code	SDP title	Students Names	Advisor	Jury members	Avenue/ Date/Hour
ENRG-2001	Design a heat extraction system for High Concentration Photovoltaic (HCPV) driving a water desalination system.	1. Ahmed Taha Okasha 2. Anas Ahmed 3. Abdullah Ghamdi	Dr. G. Fahad	1. Chair: Dr. S., Umar 2. Dr. M.S., Taher 3. Dr. T., Abdrabalnabi (GREE)	Energy department Office meeting room /May, 1/10:00 AM
ENRG-2007	DESIGN AND IMPLEMENTATION OF A TUBULAR CLAY MEMBRANE FOR USE IN WATER DESALINATION SYSTEM	1. Hassan Al-Safwan 2. Ihsan Al-Hamoud	Dr. K. Sajid	1. Chair: Dr. A.G., Fahad 2. Dr. S., Umar 3. Dr. Ihssan (KFUPM)	Energy department Office meeting room / May, 1/10:30 PM
ENRG-2002	Macro Energy Management Technique to Lower the Peak Power Supply for Eastern Region of Kingdom of Saudi Arabia	1. Hassan abu shoumi 2. Feras AlDuhaim 3. Fahad walid aldossary	Dr. M. Saleem	1. Chair: Dr. K., Sajid 2. Dr. S. Umar 3. Dr. Zaheer (IAU)	Energy department Office meeting room / May, 1/11:00 AM
ENRG-2003	Solar-Powered Radiation-Augmented Portable Desalination System	1. MOHAMMED ALWAHEED 2. Faisal ali alzahrani 3. Abdallah omar almalki	Dr. S. Farooq	1. Chair: Dr. S., Umar 2. Dr. M.S., Taher 3. Eng. F.K., Asem (Kayen Solar)	Energy department Office meeting room / May, 1/11:30 AM
ENRG-2006	Design a cogeneration system using High Concentration Photovoltaic (HCPV) for power generation and desalination.	1. Ghaith Alfalah 2. Ali Al-Matar 4. Abdulrahman	Dr. MS. Taher	1. Chair: Dr. S., Farooq 2. Dr. H., Nagm 3. Dr. Z., Gaydaa (PMU) 4.	Energy department Office meeting room / May, 1/12:00
ENRG-2004	Design of fuzzy logic control-based MPPT charge controller for stand-alone PV system	1. Mohammed Al-Talib 2. Ali Jaffer AL Qatari 3. Ali Al-Ghanim	Dr. H. Nagm	1. Chair: A., Amro 2. Dr. H., Nassir 3. Dr. J., Ibraheem (IAU)	Energy department Office meeting room / May, 1/12:30 PM
ENRG-2005	Automation and performance evaluation of a split air conditioner via Android smart phone	1. Abdulilah Almahdi 2. Abdulmohsen Olaiwat 3. Nasser Al-Ibrahim	Dr. A. Amro	1. Chair: Dr. H., Nagm 2. Dr. H., Nassir 3. Dr. G., Tarek (IAU)	Energy department Office meeting room / May, 1/1:00 PM
ENRG-2008	Experimental Investigation of different cleaning methods for Dust Accumulation on PV panel Using an autonomous Robot	1. Abdulrahman Ashraf Ashour 2. Saleem Khalid AlAwad 3. Ali Mohammed AlQarni	Dr. H. Nassir	1. Chair: Dr. Q., Amro 2. Dr. H., Nagm 3. Dr. Z., Saleh (IAU)	Energy department Office meeting room / May, 1/1:30 PM
ENRG-2009	Smart cooling Method of PV Module using Shape Memory Alloy	1. Zaid Al khateeb Ali 2. Nawaf Anwar 3. Mohammad Ibrahim Alosayl	Dr. H. Nassir	1. Chair: Dr. H., Nagm 2. Dr. Q., Amro. 3. Dr. A., Hakeem (IAU)	Energy department Office meeting room / May, 1/2:00 PM