

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قال تعالى:

"يَرْفَعِ اللَّهُ الَّذِينَ آمَنُوا مِنْكُمْ وَالَّذِينَ أُوتُوا الْعِلْمَ  
دَرَجَاتٍ وَاللَّهُ بِمَا تَعْمَلُونَ خَبِيرٌ"

صدق الله العظيم

سورة المجادلة الآية (11)

## Dedication

Our peace and grace from Allah be upon him.

To the utmost knowledge lighthouse, to our greatest and most honored prophet Mohamed

To the spring that never stops giving, to our mothers. To the big hearts our dear fathers.

To those who have demonstrated to us what is the most beauty of life our brothers.

To the people who paved our way of science and knowledge all our teachers distinguished. To the taste of the most beauty moments with them and our friends.

## **Acknowledgement**

Above everything else we thank the Lord for seeing us thus far with all this work. His guidance is something we could not do without.

We would like to express our deepest gratitude to our electrical department and supervisors A: **Gaffar Babiker** for generous support supervision and for the valuable knowledge that he shared with us.

We learned valuable lessons from his personality and his visions. We particularly thank him for his insight, his advice and help towards the overall success of this research. Without his encouragement, we are not sure if the project would have been implemented as successfully as is the case. He was always available for consultation and ensured there was no laxity in the implementation of the research.

Finally, and most importantly, we would like to express our deep appreciation to our beloved families, for all their encouragement, understanding, support, patience and true love throughout the ups and downs.

## **Abstract**

The conventional electrical network grids are considered very complicated networks therefore many measurement instatement are used to measure the parameters of these grid to solve the problem that accrued to maintain the stability of the network grid. Therefore the modeling and simulating of grid-connected photovoltaic (PV) using MATLAB SIMULINK to simulate the PV generator integrated to the grid. The simulation includes the study on response of PV generator when solar irradiance changes for studying the I–V and P–V characteristics of a PV array, and possibility of connecting to the utility grid.

## مستخلص

تعتبر الشبكات القومية الكهربائية من الشبكات المعقدة وتعتمد على اجهزة قياس متعددة تعتمد على قياس كل المعاملات القياسية بالشبكات مما يؤدي الى معالجة المشاكل التي قد تطرأ بالشبكة القومية حتى يتم استقرارها بالصورة المطلوبة عليه تعتبر نمذجة ومحاكاة الخلايا الشمسية المتصلة مع الشبكة العامة حيث تم توصيل الخلايا الشمسية على التوازي مع الشبكة العامة لتزويدها بالقدرة الكافية لتغذية الاحمال الموصلة وتمت المحاكاة باستخدام برنامج الماتلاب. وتتضمن المحاكاة دراسة التغير في الاشعاع الشمسي لدراسة خصائص التيار والجهد المتولدان من الخلايا الشمسية وامكانية توصيلها مع الشبكة القومية.

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## List of Abbreviations

Abbreviation	Meaning
PV	Photovoltaic
ICT	Information and communication technology
WASA	Wide area situational awareness
WAMS	Wide area monitoring system
WAAPCA	Wide area adaptive protection control and automation
FACTS	Flexible alternative current transmission system
HVDC	High voltage direct current
DLR	Dynamic line rating
HTS	High temperature superconductive
HAN	Home area network
MDM	Meter data management system
TOU	Time of use metering
CIS	Copper indium dieseline
CDTE	Cadmium telluride
LVD	Low voltage disconnect
PCU	Power conditioning unit
PWM	Pulse width modulation

## List of Symbols

Symbols	Meaning
$I_{pv}$	Photovoltaic current
$I_{gc}$	Light generated current
$I_o$	Dark saturation current
$e$	Electric charge
$K$	Boltzmann's constant
$F$	The cell idealizing factor
$T_c$	The cell's absolute temperature
$V_d$	Diode voltage
$R_p$	Parallel resistance
$\mu_{sc}$	Temperature coefficient of the cell's short circuit current
$T_r$	The cell's reference temperature
$I_{sc}$	The cell's short circuit current
$G$	Solar irradiation
$R_s$	Series resistance
$D$	Diode
$I_D$	Current flowing in diode
$I_{o\alpha}$	The cell's reverse saturation current at solar radiation and reference temperature
$V_g$	Band-gap energy of semiconductor
$V_{oc}$	The cell's open circuit voltage
$n_s$	Number of series cells
$n_p$	Number of parallel cells