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MAXIMUM POWER POINT TRACKING BASED iPHONE APPLICATION

Mohit Sharma[1], Sushma Gupta[2]

[1]*Electrical Engineering, Swami Devi Dayal Institute of Engineering and Technology, Haryana, India*
[2]*Electrical Engineering, Swami Devi Dayal Institute of Engineering and Technology, Haryana, India*

Abstract -*This paper represents a MPPT based iPhone application for photovoltaic array systems using adaptive (neural-fuzzy) inference systems (ANFIS). This procedure combines the learning abilities of artificial neural networks and the aptness of fuzzy logic to handle indistinct data. Thus this app lets user know about the maximum power techniques and makes the app worthy.*

Key Words: MPPT, ANFIS, iPhone App, login form, Web view, parsing.

1. INTRODUCTION

The majority of the production of energy in this modern industrialized world is strongly based on very limited non- renewable resources like petroleum. Moreover, the issues of the global energy shorting and environmental pollution due to energy have become a more concern [1]. As a result, it is very important to inaugurate the clean, safe, reliable and sustainable new energy sources like wind energy, water energy, or solar energy, etc. Solar energy is the most competent and prominent, reliable and harmless form of energy source . Thus it can be produced by the utilization of photovoltaic (PV) array [1].

Energy and environment are basically two major problems faced by human beings in the 21st century [2]. Because of its characters of regeneration and environmental protection, solar energy has already become an important substitutable energy sources. For long, researches of the Photovoltaic (PV) have concentrated on the conversion efficiency, that is, on how to generate electrical power as possible at the same sunlight intensity and environment temperature. Maximum Power Point Tracking (MPPT) on the Photovoltaic Array is the efficient method to attain this object [2].

Photovoltaic power generation using solar cells that can convert solar light energy directly to DC electricity promises to be a clean, widely appropriate renewable energy source. Researchers have shown great interest on photovoltaic (PV) technology over the past decades [3].Advancement in cell efficiency and system reliability has given wide acceptance of PV power technology for both standalone and grid interactive power generation. Sustainable growth of photovoltaic power generation throughout the world is also reducing dependence and pressure on fossil fuel considerably. The output current and voltage thus curve of a photovoltaic cell display a non-linear characteristic. By this nonlinear relationship, it is observed that there is a unique point, beneath given illumination and temperature, at which the cell generates maximum power, which is so-called maximum power point (MPP) [3].

2. MAXIMUM POWER POINT TRACKING

A Photovoltaic system straight away transforms solar energy into electricity. However, because of its low energy conversion efficiency of (20- 25%) and a greater installation cost, this technology is commonly integrated today and also it has a greater extended area of competition as compared to other conventional energy sources[4-5]. Therefore, many researchers have been concentrating to reduce these drawbacks and thus increase the Photovoltaic system efficiency. This method is more commonly named as a maximum power point tracking (MPPT) technique. The main function of MPPT technique is to achieve maximum power from a Photovoltaic system [4-5].

3. ADAPTIVE NEURO-FUZZY INFERENCE SYSTEM

Adaptive neuro-fuzzy inference system (ANFIS) amalgamates neural network and fuzzy logic. Fuzzy logic has capability to transmute the linguistic terms to numerical values using fuzzy rules and membership functions [6-7]. ANFIS combines neural network and fuzzy logic to overcome drawbacks of the individual techniques and properly tuned .The ANFIS integrates the neural network and fuzzy logic [6-7].The ANFIS method starts by fuzzification of inputs, using membership functions for information and qualifying system operation. These membership functions can be created in sufficient quantity and format to cover the full range of possible entries representing the first layer of the ANFIS system [8-9]. The second layer executes the fuzzy rules. The third layer normalizes the membership functions, and the fourth layer executes the part of the fuzzy rules, and finally the last layer calculates the output of fuzzy system by summing up the outputs of layer fourth .ANFIS incorporates both FLC and ANN to give the properly tuned output with higher accuracy. In FLC deciding the correct fuzzy rules based on error and change in error is time consuming. Therefore ANFIS based controller is designed to overcome their drawbacks [8-9].

4. RESEARCH METHODOLOGY FOR XCODE

An iPhone application is made on software development kit Xcode 7.3, all the programming is done in swift language, so an MPPT based iPhone application is made so that it can be easily downloaded from app store and can be used by the user worldwide.

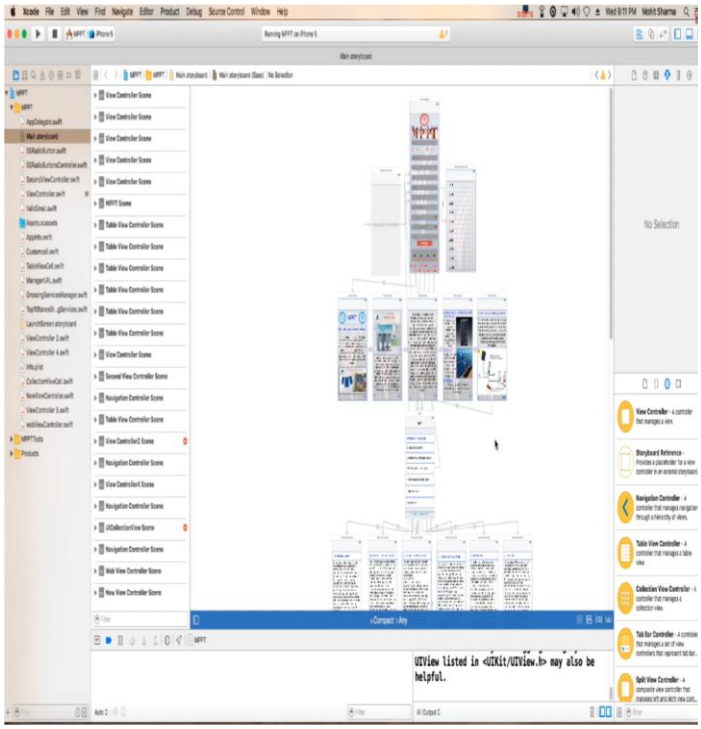

Fig-1(a): Showing Complete model.

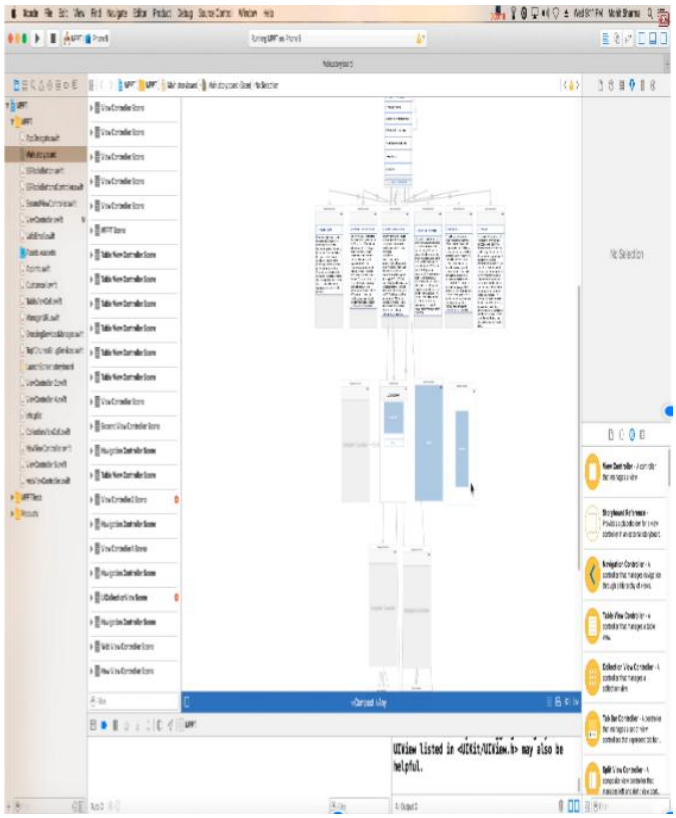

Fig-1(b): Showing Complete model.

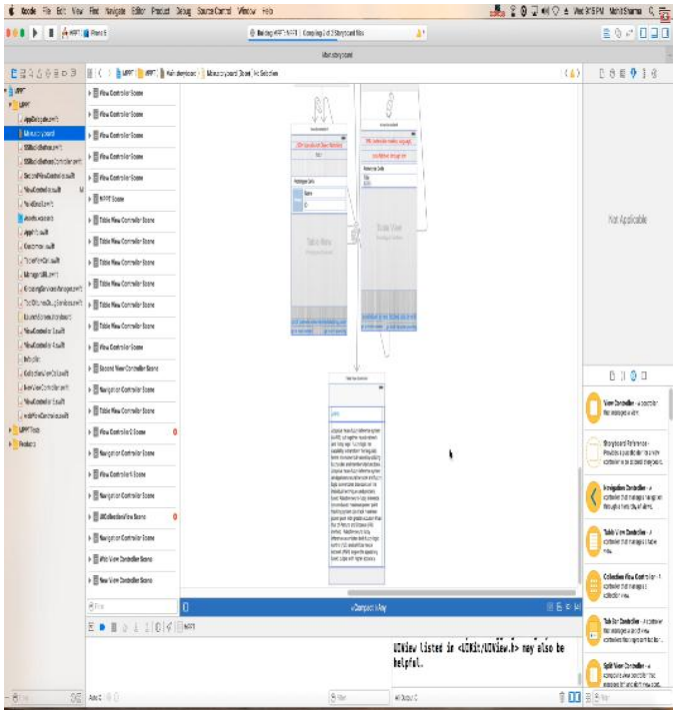

Fig-1 (c): Showing Complete model.

4. RESULTS OF XCODE FOR iPHONE

All simulations were done in the XCODE 7.3 enabled by the computer with a 4 GB RAM. SIMULATOR was utilized for developing the iPhone application and thus the results are shown in this section. The first screen shows the main screen which is basically an sign up form for the user.

Fig-2(a): Shows main screen sign up form.

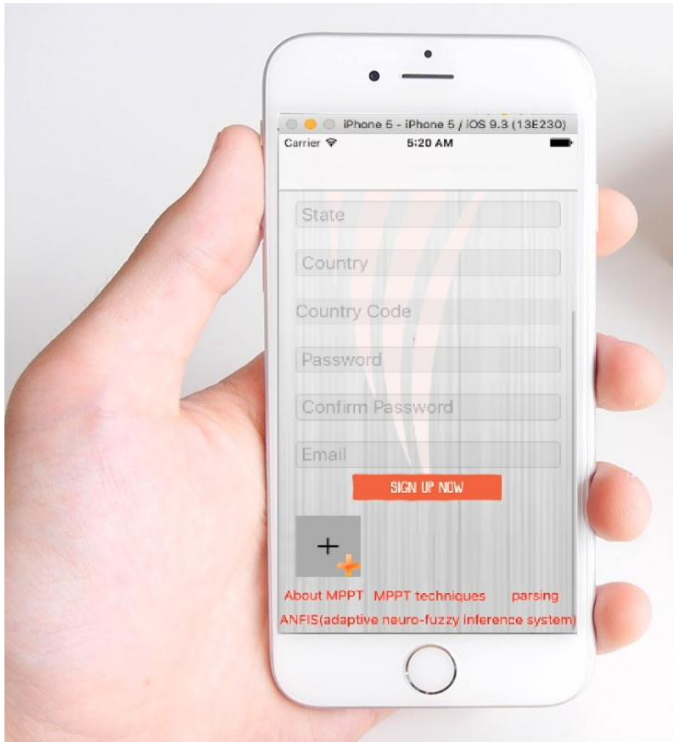

Fig-2(b): Shows main screen sign up form.

Fig.2(a) ,Fig.2(b)shows the main screen the sign up form that is user can fill the basic information here which is the scroll view so that user can scroll down and fill the information. This main screen can direct towards all the screens by the segue buttons at the bottom it also contains the tap changers so that user can upload there images from their cell phones.

Fig-3(a): Shows filling of sign up form.

Fig.3(a) shows that the user filled the text fields of user name, name date of birth, city state and country thus the validations in the date text field is such that the user is restricted to the range of 50 years, the city text filed validation is such that is shows auto suggestions while typing the name of the city it is similar in the case of state and country. Date picker is used in for the selection of date, month and year for the user. Which is basically an scroll view of date months and year. The user also change or delete the data entered in the field by clicking the text filled and interactive logos are also been implemented on and behind the field.

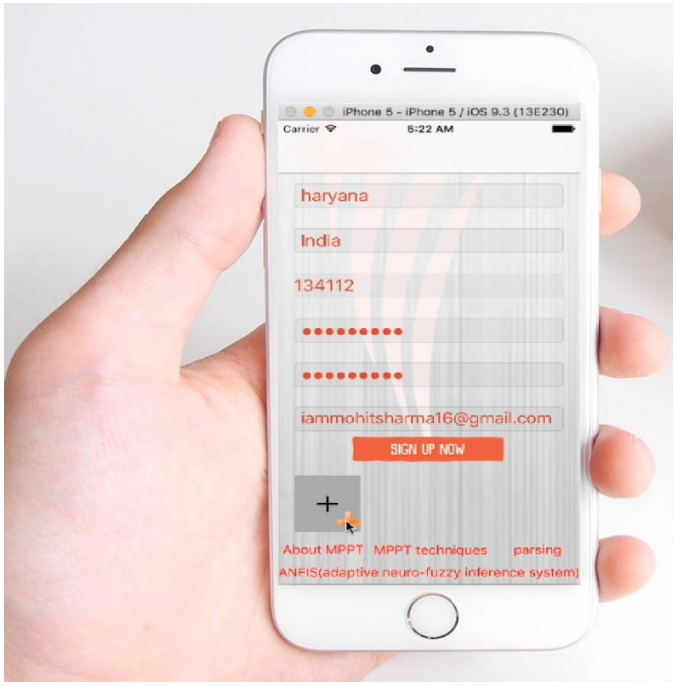

Fig-3(b): Shows filling of sign up form.

Fig.3(b) shows the filling up of sign up form that after filling the above information user fills the country code, the validation in country code is done so as that user can fill more than 6 digits if in case user fills more than six digits error message will pop up that the digits should be less than six hence after filling the country code user sets an password and confirm password form him /her .The validation in the password field is done such that it should conation less than 9 digits also while the user fills the password text field the strength of password is also shown by the label color change from red yellow to green if in case user fills less digits error message will pop up that the digits should at least 9.

Fig.4 shows the collection view with the wiki links, as the user clicks on the button of different MPPT techniques the user is directed towards the collection view which is basically an collection view with an wiki links, the user see the different MPPT techniques fallowed below the wiki link. When an user clicks on the image the image gets enlarged and when user clicks the link below the technique the user is directed towards the Wikipedia of

the technique. Which shows all the information about those techniques, Here in **Fig.4** the collection view of the Perturb and observe and incremental conductance followed by their wiki links are shown.

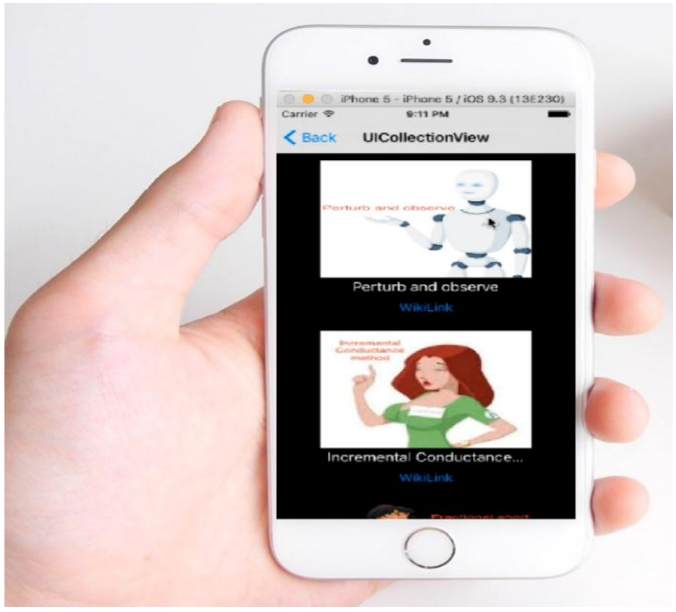

Fig-4: Shows collection view

Fig.5 shows the JSON parsing of data, as the user clicks on the button of different parsing the user is directed towards the JSON parsing view which is basically an web view, as the user clicks on the fetch button above the web view the data gets loaded up by the link used in programming thus the parsed data is shown in the following web view , this can also be scroll down to read the following content as scroll view is used in the web view there are two more buttons in the bottom they are to go to the main screen and to go to the XML parsing . When user clicks on the button go to main screen the user is directed back to the main screen and if the user clicks on the XML parsing button the user is directed towards the xml parsing.

Fig-5: Shows the JSON parsing of data.

Fig.6 shows the XML parsing of data, as the user clicks on the button of parsing the user is directed towards the JSON parsing and then after clicking on the xml parsing button at the bottom the user is directed towards the xml parsing it also contains the data which gets loaded up by the link used in programming thus the parsed data is shown in the following web view, this can also be scroll down to read the following content as scroll view is used in the web view there are two more buttons in the bottom they are to go to the main screen and go back to the JSON parsing.

Fig-6: Shows the XML parsing of data

5. CONCLUSIONS

An iPhone based application is made for maximum power point tracking for photo voltaic cells for the user the application is useful for the user as helps the understanding of photo voltaic systems and thus creates an ease to work on different maximum power point tracking techniques. Thus the iPhone application gives the users to know about maximum power point tracking with a login form which can the record of user, a web view which shows an Wikipedia links of various maximum power point tracking techniques, JSON parsing and XML .

6. ACKNOWLEDGEMENT

Thus the performance tracking of maximum power delivered to photovoltaic systems using adaptive (neural-fuzzy) inference systems (ANFIS),which is method that combines the learning capabilities of artificial neural networks and the appropriateness of fuzzy logic to manage indistinct data. It is accordingly able to be shown in the iPhone application hence making it worthy for this work, which is to know the maximum power point in an iPhone application.

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