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Line Interactive Embedded Control System for Fault Detection and Grid Maintenance in PV Cell Arrays

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ABSTRACT:

In this project the assembly of power generation is especially hydraulic and thermal, fuel primarily based in this world. The Eco-Friendly power generation may be a vital in gift things; By exploitation solar energy generation we are able to overcome this drawback alright. Such a big amount of Research and Development engineers try to extend the potency of solar energy generation exploitation PV (Photo Volatile) modules to use them most potency. It's Associate the alternate method of hydraulic and thermal, fuel primarily based for power generation. The potency of solar energy generation will cut back as a result of faults in solar PV cells. The target of the project to find the faults in solar PV cells array & analyzing the output of power generation potency and grid maintenance by exploitation PIC16F877A Microcontroller. The potency of output generated power and total out place power displaying within the LCD. The line fault detection in solar PV cell and total power generated output data send to approved mobile via GSM sim-900 module.

Keywords: ***PIC16F877A Microcontroller, GSM Sim-900 Module, Solar Photo Volatile(PV) Cell, Liquid Crystal Display (LCD), Power Generation, Grid Maintenance.***

I. INTRODUCTION:

Solar energy could be a quite inexhaustible inexperienced energy which might be utilized by the human beings freely and fairly. Solar PV power generation, as a use style of solar power, converts the solar power into current through transducer electrical phenomenon impact.

Electrical phenomenon power generation technology involves variety of fields like mechanical drive, electrical and mechanical management, concentrating technology, power natural philosophy, automation technology and alternative fields. At the side of the appliance of versatile integrated development system within the PV Research and Development platform, it's been attainable to form speedy development of various PV products.

PV power generation has been applied additional and additional wide thanks to several blessings like freed from pollution, safe, while not noise, general resource, simple to put in, and short construction amount. Cell is that the key element that allows the conversion of solar power into current.

Once the ability system capability is massive, it's required to conduct star electrical phenomenon array through series-parallel association of multiple cell modules. In theory, the cell modules typically have the life of regarding twenty years, however within the actual application, attributable to module packaging technology and alternative reasons, some cell modules, once being employed for 8-10 years, are going to be broken, therefore moving power output. Therefore, it's of nice significance to effectively and quickly decide the fault of the cell modules, and to confirm the normal operation of the solar energy station.

In this proposed technology fault detection and analysis of PV cell using the PIC16F877A microcontroller. The proposed system is classified into PV cell array unit and analysis unit. GSM is used to establish communication between these two units.

The PIC16F877A microcontroller is used in both the units for its inbuilt ADC module, low cost and higher

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efficiency in power generation applications. A GSM device based on AT commands protocol is used for communication purpose, this device is most suitable for point to point communication in a wireless environment.

II. PROCESS FLOW:

Sensors in the PV cells are interfaced in different analog channels of the PIC16F877A microcontroller. Initially the output from the sensor value send to PIC16F877A microcontroller. Then controller sensor information will send to the mobile unit via GSM sim-900. GSM is connected to the USART channel of the PIC microcontroller. The on top of figure shows the diagram of the projected star PV Cell fault detection and analysis of the system.

For every solar power output measurement, the normal operation limits can also be expressed in terms of kW by taking their values expressed in terms of the ratio measured solar power/modeled solar power, and multiplying them with the power output calculated by the model.

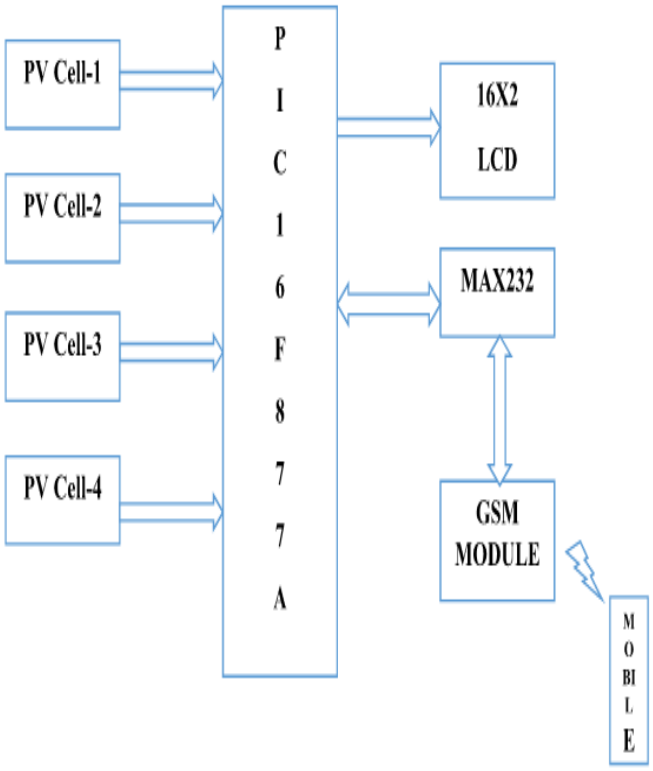

Fig: Black diagram of proposed system

III.HARDWARE DESCRIPTION:

In this device unit, solar PVcell sensor to determine the light intensity. These kinds of device underneath the class of resistive kind. Therefore, this paper proposes a modified MPPT algorithm, i.e., able to provide fast response without the requirement of an extra control loop.

Other than that, the proposed system also does not require the intermittent disconnection. The proposed PV system simply consists of a DC to DC converter which connected in between the PV module and load. Then, the current and voltage of the PV module are sensed by a PIC controller, which is also used to execute the modified algorithm. An inverter and a rectifier are connected at the output of the DC to DCconverter to validate the proficiency of the proposed algorithm under a nonlinear load.

The resistor circuit is employed to convert the modification in resistance into voltage. This voltage output of divider circuit is interfaced on to RA0, RA1, RA2, RA3 and RA5 pins of ADC module. equally GSM sim-900 is connected to Tx and Rx pins of USART module.

The output voltage of PIC16F877A is not enough to drive the out put. The device pin DIRA and DIRB are connected in passage of the PIC microcontroller. The GSM Ssim-900 is connected in USART module RC6 and RC7 pins.

IV. ALGORITHM:

MP LAB X IDE professional for PIC could be a full-featured ANSI C compiler for PIC devices from Microchip. It's the most effective answer for developing code for PIC devices. It options intuitive IDE, powerful compiler with advanced optimizations, millions of hardware and software package libraries, and extra tools that may assist you in your work.

Compiler comes with comprehensive facilitate file and much of ready-to-use examples designed to urge you started in no time. Hi-Tech C Compiler license includes free upgrades and a product period school support, thus you'll trust facilitate whereas developing.

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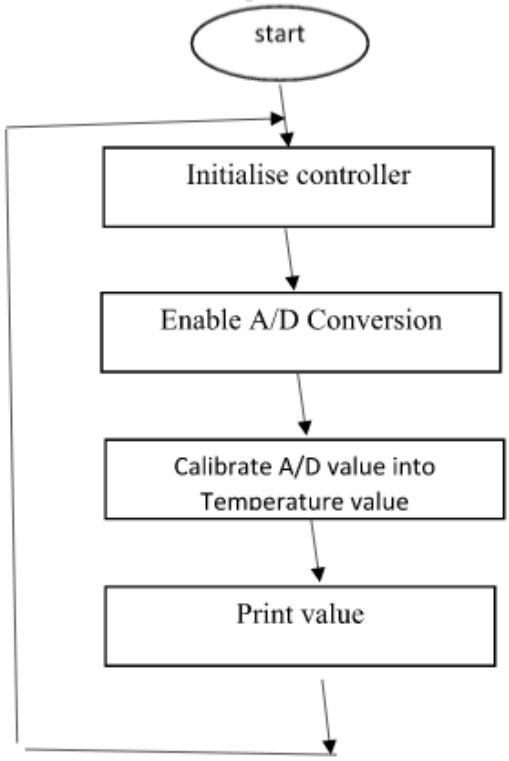
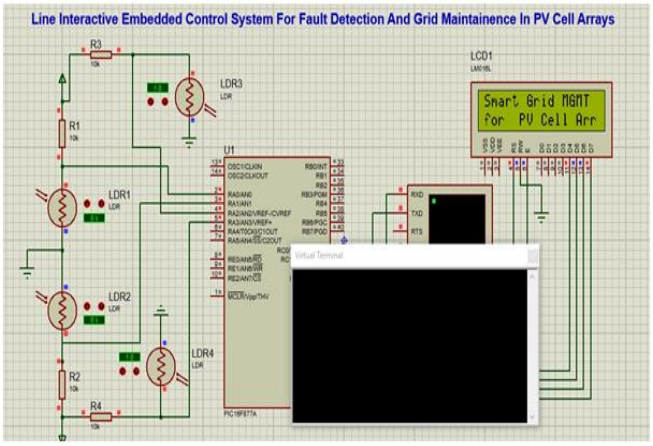
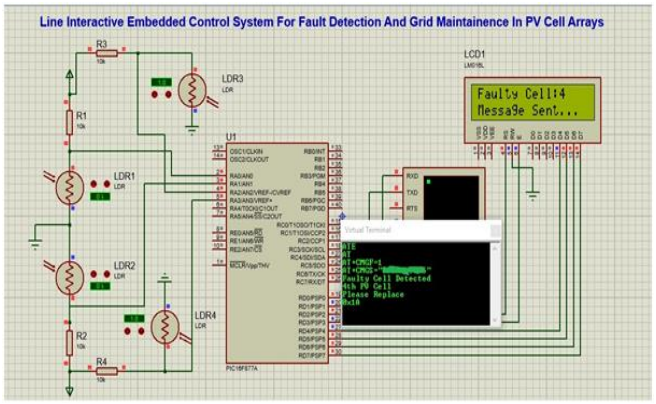
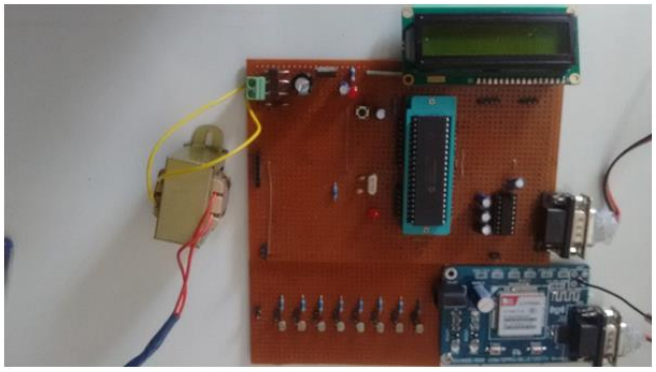
PIC tool kit 3 is a programing software for PIC programming device. The configuration bits have to set according to the crystal oscillator used and some other parameters used in our microcontroller before writing the Hex file into microcontroller.Using MPLAB X IDE the code for PIC16F877A microcontroller is developed and the output is verified through a ProteusV8.0 in ISIS simulator. This operation is discussed below in algorithmic form.

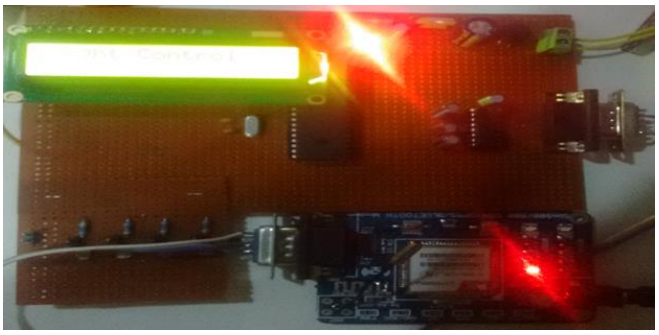






V. RESULT:





VI.CONCLUSION:

In this proposed Project, line interactive embedded control system for fault detection and grid maintenance in PV cell arraysis successfully developed and implemented in real time environment. This system is developed at low cost, low power and in time better performance in the experimental setup.

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