REMOTE MONITORING, DUST DETECTING AND CONTROLLING OF SOLAR PHOTOVOLTAIC USING IOT

K.Divya[1], M.Aarthi[2], J.Fousiya Sirin[3], R.Haritha[4],J.Iswarya [5]

[1]*AssistantProfessor, Department of EEE, M.Kumarasamy College Of Engineering, Karur, Tamil Nadu*

[2,3,4,5]*B.E., Final Year, Department of EEE, M.Kumarasamy College Of Engineering, Karur, Tamil Nadu*

ABSTRACT

solar photovoltaic cells power generation performance monitoring and control can be implemented by IOT which enhances the performance in massive way.The proposed solution is based on installing sensors for monitoring the solar panel and update in a internet browser through define IP address with help of IoT module. The faulty Solar panel is identify by means of its output and it is disconnected through IoT module from web browser. It helps to improve the output of solar panel unit.

Keyword: - *Internet of Things; Remote monitoring; microcontroller; Sensors; Solar panel; wireless communication*

1. INTRODUCTION

Sunlight acts as a source for photovoltaic energy and operation. A photovoltaic system consists of an array of PV modules, an inverter, a battery and connecting wires. From the solar panels sunrays is fed into the inverter and transformed into alternating current (AC). Solar monitoring systems will track the amount of electricity that solar panels have generated and contributed to the power grid. The dust presents on the surface of PV will reduce the efficiency of solar panel output by 50%.

The development of IoT is a step-by-step process. Consumption of power rate is growing enormously led to the way for usage of energy efficient technologies and finding of new efficient usage for renewable energy sources [3].A smart remote monitoring system is proposed using Internet of Things (IoT), for monitoring the ordered parameters of Solar Power Unit (SPU). Hardware setup consists of Microcontroller Atmega 328p, Wireless Transceivers nRF2401L, Microcontroller Atmega 2560, IOT Module ESP8266. Software requirement are Atmel Studio 7.0, Multiuse for Circuit Design, Flash Programmer for flashing program.

2. EXISTING SYSTEM

Previously, an automated IOT based solar power monitoring system is used for monitoring solar photovoltaic system from anywhere over the internet with arduino based systems. In existing system, they implement IOT system through GSM modem with help of AT commands. A set of solar panel is monitored by voltage, current and temperature sensor. This data are collected from the sensor by microcontroller and updated in back data process called as Data logger. The Solar panel output depends on many factors like temperature, Light etc. One main factor for reducing output voltage improper connection. This layer will reduce the induction of thermal energy over the PV panel. This also reduced conversion efficiency.

3. PROPOSED SYSTEM

User can monitor the voltage generation of solar panel individual and total voltage supplied to Load .User can find the solar panel performance User can connect and disconnect the solar panel from their web browser without going

to the generation area. It can connect more than one solar panels area to the monitor section. This data will be updated in their web browser. Block diagram of the PVcells automation as shown in figure1.

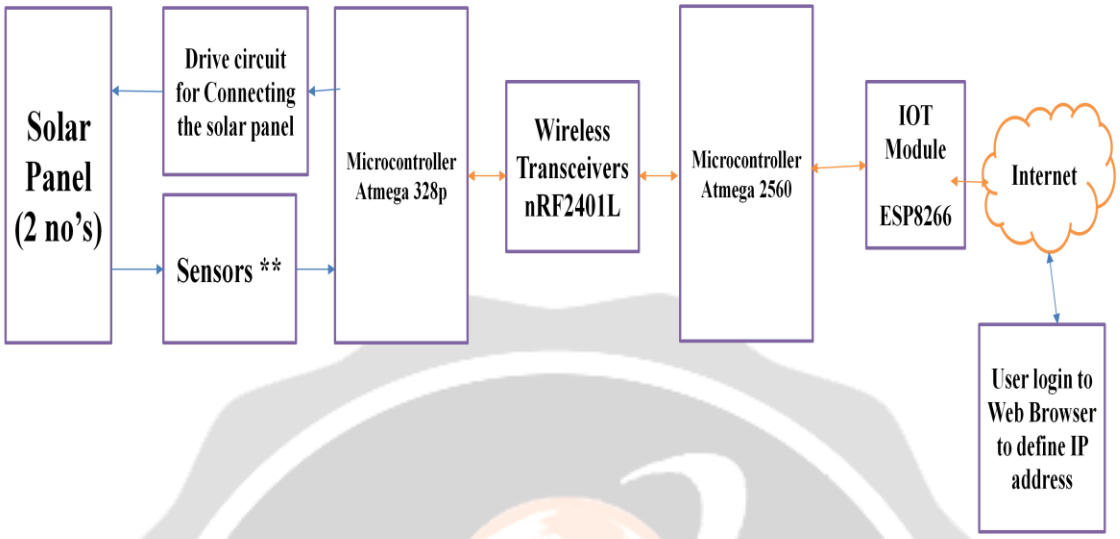

Fig-1: Block Diagram of the PV automation

4. COMPLETE SYSTEM DESIGN

IoT based remote monitoring system having more advantages when compare to other type of systems.
The acquisition of data of the project is able to acquire the values of the Voltage, Current, solar panel V, solar panel I, Grid V, Grid I, PV cell isolation and temp of the system.

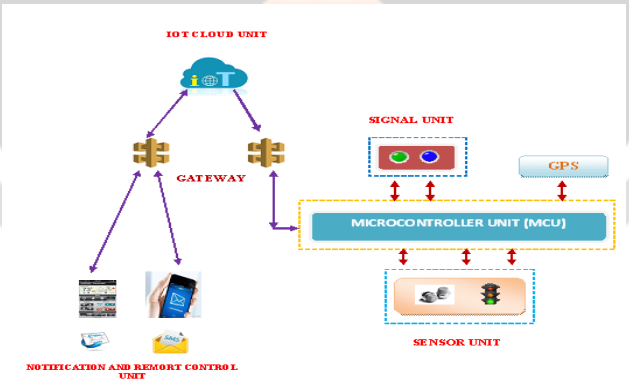

Fig-2: remote monitoring dust detecting and controlling of solar photovoltaic using IOT

Voltage sensor sensed the photovoltaic load, and potential transformer monitored the Grid voltage, current transformer monitored the Grid current.. A solar PV cell is used to record the solar isolation. LM35 temperature sensor can measure the module temperature. Minimum power consumption RISC microcontroller called PICI8F46K22 act as the main part of data logging unit. It has a Digital Memory for storage of the data. Data will be store on memory of unit is monitored by PIC18F46K22 microcontroller which is using protocol.

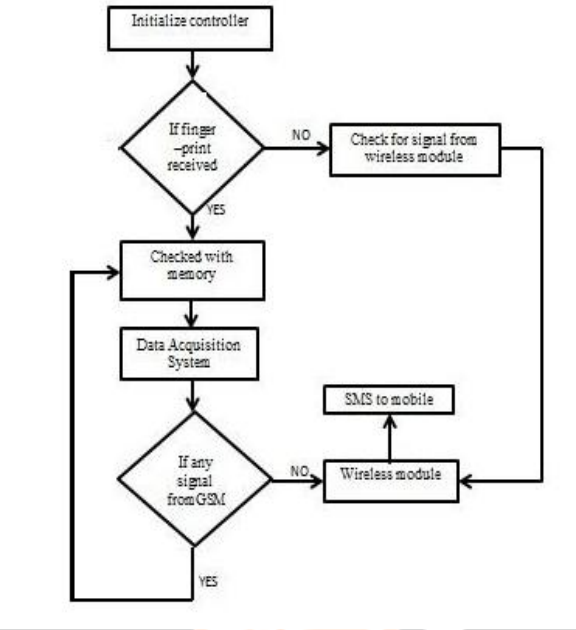

Fig-3: Flow chart for Data Storage

Data logger is connected to a Lab PC by a serial to USB converter. The figure4 shows the hardware assembly for this system.

4. WIRELESS TRANSFER MODULE

The data transfer module and the IOT of the module communicate by GSM/GPRS module named SIM900. GSM/GPRS module which is integrated with AMR926EJ It delivers data. This module is a low power consumption module. The project is 20mm x 20mm x 2.5mm.It is interfaced by COM port. It has a specific IP address and hotspot carrier. AT [9] commands are programmed by microcontrollers to monitor and control the PV module.

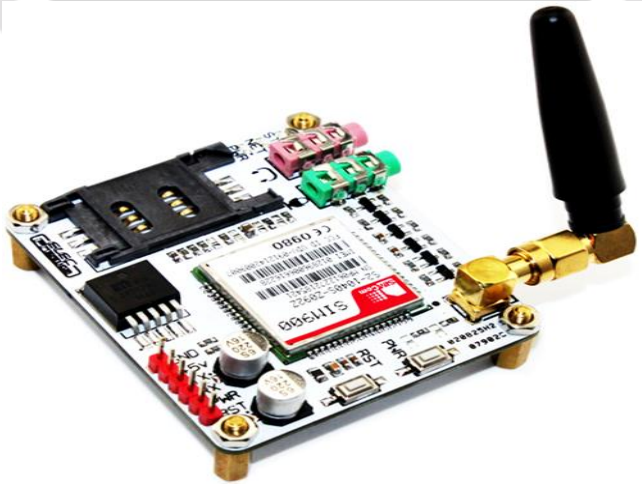

Fig-5: SIM900 GPRS module

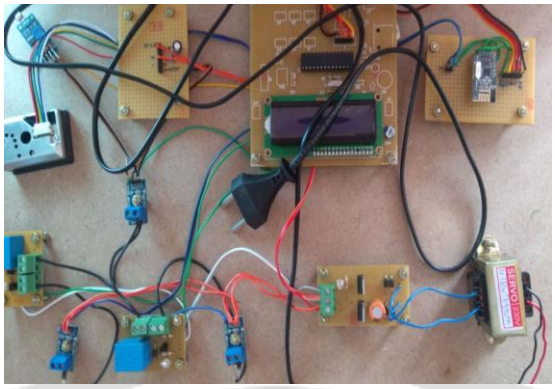

Fig- 6: Hardware-solar monitor

Fig-7: Output of the project

5. CONCLUSION

In this project automation of PV cell monitoring will enhance further plans for implementation of the huge scale of PV cells integration with a smart grid in upcoming years. In our paper we proposed the Remote Monitoring, dust detecting and controlling of solar photovoltaic using IOT successfully done and the data which are collected from fare end of PV panels is transmitted to the monitoring station and data are displayed in the respective connecting device.

6. REFERENCES

[1].Dr. Ovidiu Vermesan SINTEF, Norway, Dr. Peter FriessEU, Belgium, "Internet of Things–From Research and Innovation to Market Deployment", river publishers' series in communications, 2014.

[2].A Vision of IoT: Applications, Challenges, and Opportunities With China Perspective Shanzhi Chen, Senior Member, IEEE, Hui Xu, Dake Liu, Senior Member, IEEE, Bo Hu, and Hucheng Wang

[3].Putta Sindhuja* and M. S. Balamurugan School of Electronics Engineering, VIT University, Chennai

[4].chen Peijiang,Jiang Xuehua,"Design and Implementation of Remote Monitoring System Based on GSM",2008 IEEE Pacific-Asia.Workshop on Computational Intelligence and Industrial Apllication.

[5].Han D-M, Lim J-H. Smart home energy management system using IEEE 802.15.4 and ZigBee. IEEE Transactions on Consumer Electronics. 2010 Aug; 56(3):1403–10.

[6].Han J, Choi C-S, Park W-K, Lee I, Kim S-H. PLC-based photovoltaic system management for smart home energy management system. IEEE International Conference on Consumer Electronics (ICCE); 2014.p. 184–9.s

[7].Oussama BENBELGITH,Lasad SBITA, "Remote GSM module monitoring and Photovoltaic System control", 2014 First International Conference on Green Energy ICGE 2014.

[8].S.V. Tresa Sangeeta, Dr. S. Ravi, Dr. S. Radha Rammohan,"Embedded System Based Inductrial Process Automation andRemote Data Logging Using GSM with Web Technology",International Journal of Applied Enginerring Research, ISSN 0973-4562, Vol. 8, No 20 (2013)

[9].Priti. G. Pachpande, "Internet Based Embedded Data Acquisition System", International Journal of Electronics Communication and Computer Engineering, Volume 5, Issue (4) July, Technovision-2014, ISSN 2249-071X.

[10].Marijana Vidas-Bubanja," implementation of green ict for sustainable economic development", mipro2014, 26-30 May 2014, Opatija, Croatia.Hu Q, Li F. Hardware design of smart home energy management system with dynamic price response. IEEE Transactions on Smart Grid. 2013 Dec; 4(4):1878–87.