International Journal of Advanced Technology and Innovative Research

www.ijatir.org

ISSN 2348–2370
Vol.08,Issue.21,
November-2016,
Pages:4108-4110

Development of Android Based On-Line Monitoring Nand Control System for Renewable Energy Sources

VEERRAJU BATTU[1], GAJJALA ASHOK[2]

[1]PG Scholar, Dept of ECE, St Mary's Engineering College, Guntur, AP, India.
[2]Assistant Professor, Dept of ECE, St Mary's Engineering College, Guntur, AP, India.

Abstract: In this project, we proposed an Implementing Intelligent Traffic Control for Congestion, Ambulance clearance, and Stolen Vehicle Detection. This system was implemented based on present criteria that tracking three conditions in those one is heavy traffic control and another one is making a root of emergency vehicle like ambulance and VIP vehicle and finding theft or crime vehicle. Here Each individual vehicle is equipped with special radio frequency identification (RFID) tag (placed at a strategic location), which makes it impossible to remove or destroy. The system also update the traffic information on internet which is helpful to the travelers and traffic control departme The options offered by smart phone technology and apps are virtually limitless. Here the proposed system is designed for online monitoring of solar panel performance and load status. proposed method utilizes the Bluetooth interface of Android Tablet/ Mobile phone as a communication link for data exchange with digital hardware of Power Conditioning Unit (PCU). The Low Cost Android tablet can replace the graphical LCD displays and internet modem of RES Power Conditioning Unit (PCU) with enhanced graphical visualization and touch screen interface. And the developed application will collect the information from digital hardware and uploads into the internet. This enables the online monitoring and controlling of the proposed system.

Keywords: Radio Frequency Identification (RFID), Power Conditioning Unit (PCU), Human Machine Interface (HMI).

I. INTRODUCTION

Renewable Energy Sources are becoming an entrusting factor and promising contributor in the electricity production. They are the major players in the electrification of rural areas which are still 'not wired' both electrically and geographically. The effective dissemination of such decentralized RES power plants can be accelerated by better monitoring and control tools. Hence, the selection of communication interface becomes a 'choice of intelligence '. The effective integration of RES sources to existing power grid infrastructure has a great impact on modernization of legacy grid to smart grid, which monitors, controls and optimizes the operation of interconnected elements. There are different methods for monitoring the RES sources; an on-board web server can be utilized, but it has constraint/limitation on memory and sometimes we have to take care of additional wireless infrastructure as most of RES plants are located in remote areas. There are web server modules available from different manufactures like Rabbitcore, Arduino, Raspberry-pi etc. These are basically an embedded hardware with communication interfaces like Ethernet for internet connection and SCI/SPI for communicating with embedded controllers in devices like PCU. These type of hardware demands an additional interfaces for HMI. This paper proposes an android based online web monitoring solution for RES power plants. The Android tablet can also be used as a local Human Machine Interface (HMI) for RES based PCUs. The hardware and software were tested with a 25 kWp grid interactive solar photovoltaic power plant installed at our laboratory and achieved very promising results.

II. DEVELOPED ON-LINE MONITORING SYSTEM

The heart of the system is a tablet running Android OS 3.1or later. This application demands Bluetooth interface and internet connectivity for the Tablet. The Bluetooth interface of the tablet is utilized as bi-directional communication link between the tablet and solar PCU. The PCU has a DSP and FPGA based digital controller hardware platform inbuilt with UART interface. A serial to Bluetooth converter module is used to convert the UART data of PCU controller to Bluetooth format which act as an Interface between the PCU and tablet. The system Architecture developed is shown in Fig.1.

Fig.1. Architecture of Anodroid based RES on-line monitoring system.

A. Solar PCU

The grid connected solar Photovoltaic(SPV) power plant exports power generated by the SPV array to grid during daytime, when there is enough solar insulation. Fig.2 is the block diagram of a typical solar PCU. A DC-DC converter connects the SPV array to an intermediate DC bus at a fixed voltage. The grid side inverter connected to this DC bus delivers power from the SPV array to the grid at unity power factor with minimum THD in the exported current. The 25kWp grid interactive SPV power plant is an integration of three basic interface modules (BIM), each of them are rated for 10kWp. Fig.3 is the photograph of the solar PCU developed.

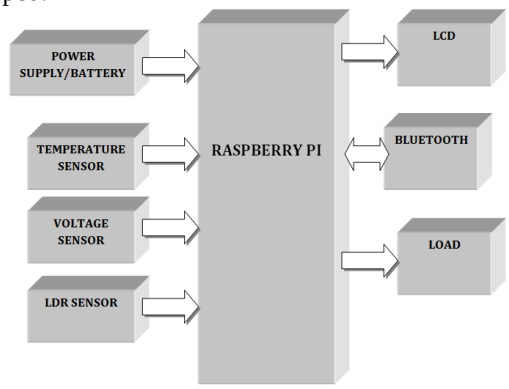

Fig.2. Block Diagram.

Operations of these three BIMs are independently controlled and coordinated using embedded digital controller with TMS320F2812 DSP and Altera EP2C5 FPGA. The data acquisition of SPV module is accomplished by four 8 channel simultaneous sampling ADCs with 12 bit resolution. The DSP has in-built UART module for serial communication. Solar PCU communicates its status and other information to tablet through serial port. Fig.3 shows the photograph of embedded digital controller hardware platform of solar PCU.

B. HMI communication PCB

HMI communication PCB is a key element in online monitoring and control system which is designed to facilitate the interconnection with PCU as shown in Fig.3. It consists of PIC18F4550 microcontroller and Serial to Bluetooth converter module, HC-04/HC-05/HC-06. The micro controller is used for data manipulation as well as to provide an optional USB interface to the Tablet. The whole system has been incorporated with both USB and Bluetooth interface which acts a communication link via the Tablet to the global network environment. The HMI PCB has a physical UART communication interface with PCU with bi-directional data exchange capability with PCU. The remote control system has yet been implemented with HMI as the proto type is still at running stage. More features will be incorporated in future with further development of any new plug-in equipment.

C. Android application

Developed application requires an android tablet with operating system 3.1 or later with Bluetooth interface and internet connectivity. The internet connectivity is not mandatory, if it is planned to explore the local HMI function alone as shown in Fig.5. A free downloadable android development tool (ADT) is used to develop application on android platform which is an eclipse based Integrated Development Environment (IDE)where JAVA programming language is used for application development.

Fig.3 Photograph of HMI PCB.

Local HMI: Tablet runs an application to display various parameters like solar DC input voltage & currents, grid voltage, grid currents, frequency and system status etc. Fig.4 is the screen shot of local HMI taken from an Android device.

Fig. 4 Screen shot of HMI from Android device.

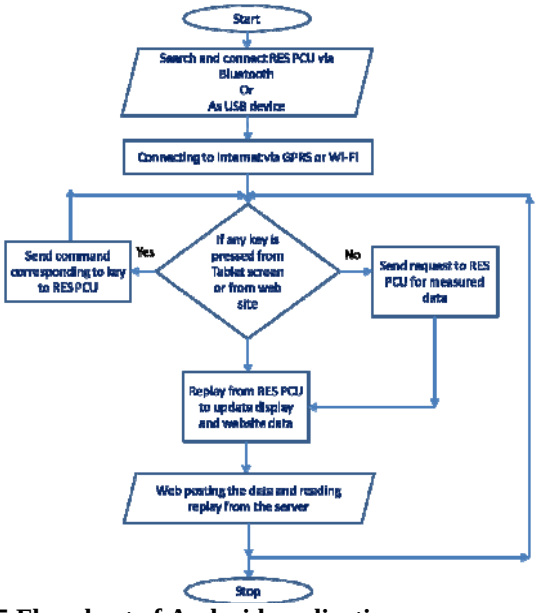

Fig.5 Flowchart of Android application.

Web Monitoring And Control: The information from the RES PCU is made available through on-line by an android application. The PCU is communicating to server via this android tablet. The method of web posting is utilized for web enabling the system. The data communication between Android tablet and the web server is through a PHP file in the web server and it appends an XML file in the server. The data updated in XML file is read by a Java script function in regular interval. All parameters which are available in the local display now become accessible to remote user through internet. The developed web application not only providing the status display parameters but it can also be equipped with control functionalities available to the user. The authorized user can login with valid password and control the system remotely. Fig.6 is the screen shot of on-line monitoring system.

Fig. 6. Screen shot of on-line HMI.

This Android based local HMI and on-line monitoring system is feasible and cost effective solution for monitoring of RES PCUs where a single platform can replace both local HMI with graphical LCD and keypad. The on-board web server for web enabling of the system is established without any additional requirements with the help of UART module embedded inside digital controller hardware of RES PCU, Since UART is a cheap and common interface in almost every micro controllers and DSPs available in the market as shown in Fig.7. Nowadays, the price of Android based tablets are being reduced and this display can also be used as a local storage infrastructure for logging of important events and data for post analysis.

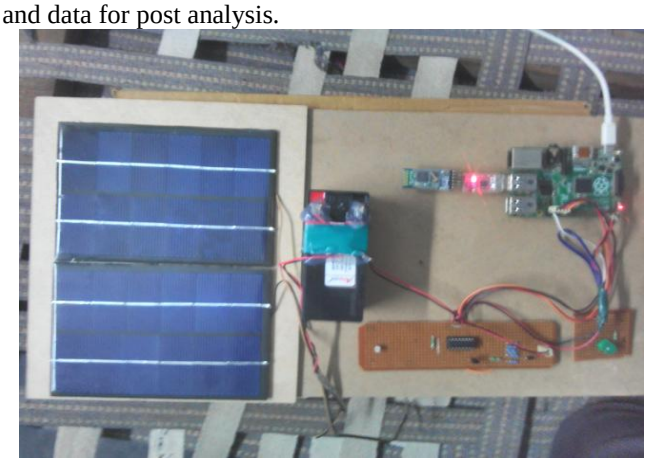

Fig.7. Implemented circuit.

IV. SUMMARY AND FUTURE SCOPE OF THE WORK

The "SMART PHONE BASED ONLINE MONITORING AND CONTROL OF SOLARENERGY**"** can collect sensor data intelligently. It was designed based on ARM and the application of wireless communication. It is very suitable for real-time and effective requirements of the high-speed data acquisition system in renewable energy industrial environment. The ARM greatly simplifies the design of peripheral circuit, and makes the whole system more flexible and. Here the values of sensors is measured By this the critical situation can be avoided. We can monitor the sensors through smart phone and internet. In future the system also equipped with GSM modem for sending instant alerts to the authorized persons, even internet connection is not available.

V. REFERENCES

[1] Development of a data acquisition system for remote monitoring of renewable energy systems Kostas Kalaitzakis, Eftichios Koutroulis, Vassilios Vlachos Department of Electronics and Computer Engineering, Technical University of Crete, GR-73100, Chania, Greece.

[2] Controllogger: A remote monitoring system for decentralizedrenewable energy sources : Fábio T. Brito, Sandro C.S. Jucá andPaulo C.M. Carvalho.

[3] Communication Systems for Grid Integration of Renewable Energy Resources : F. Richard Yu, Peng Zhang, Weidong Xiao,and Paul Choudhury Department of Systems and ComputerEngineering Carleton University, Ottawa, ON, Canada, K1S5B6.

Author's Profile:

Mr. Veerraju Battu received the B.Tech degree in Electronics and Communication Engineering and M.Tech degree in Digital Electronics and Communication Systems. Currently, he is working as Assistant Professor in the Department of Electronics and Communication Engineering,Srinivasa Ramanujan Institute of Technology, Rotarypuram, Ananthapuramu.

G Ashok, He is currently working as Assistant Processor, Dept. of ECE, SMGG, Guntur. He teaches at SMGG, signal &systems, Probability & Stochastic Processing, Digital Signal Processing, Circuits &Systems,and Digital Image Processing.He has 3 and half years of Teaching & Research Experience. He published few International Journal's. He holdB.Tech&M.Tech from JNTUA. Area of Research, Electromagnetism, Artificial Neural Networks, Superconductivity, Intellectual systems design. Follow him on:
http:\www.howtoadapttonewtechonology.blogspot.com