

Solar Broadcast System with Flood Monitoring

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ABSTRACT

Today, we are seeing an increasing need to stay connected. With expanding economic and technological scenario, the need of having a fast-track production has also increased. The industries explore and employ several techniques to stay ahead in the production line to fulfil the demand of their consumers. This requires an extremely good communication and co-ordination in the process pipeline. To facilitate this, a communication system should be deployed to enhance communication amongst the different sectors of the industrial workstation. The systems today offer monitoring and communication facilities of the work place or in general use a public address system to make general announcements which can be accessed from one fixed location. This synopsis presents a technique to remotely make announcements using GSM with solar incorporated. The proposed system aims to connect the owner or an authorized person from any part of the world to the workstation, thereby ensuring that distance is not an issue for communication.

Keywords: GSM, Communication, MTTP, Broadcasting, monitoring, solar panel, Arduino, ATmega IC 328, Amplifire Circuit, Speaker, SIM800, GSM Module, LEDs

I. INTRODUCTION

The mobile communication technology has become extremely important in our modern day lifestyle. The popularity of the technology is owing to the fact that it ensures communication is always ubiquitous. People's need to stay connected has ever increased personally and professionally. A simple communication in form of technology

developed in distant corner of world can serve lot many efforts of the industry or communication in form of knowledge about the trends and demands of the consumers reaching in time can earn profits to the industry. The success of anything lies on how effectively we communicate.

Talking of average industries the scenario in work station currently involves monitoring and communicating facilities. The communication is generally using a public address system accessible from the control room only. This system inherits a delay in case of emergency or even when an urgent communication is to be made.

We have seen many cases of public addressing systems that require the physical presence of the user to announce. This might not be possible in many cases like emergencies and rudimentary actions like repetitively speaking over the microphone, most of which either requires the presence of the human or recording of human voice. So due to the need to stay connected we need more efficient systems that can announce over a large range and do not require physical presence all the time. The use of GSM can bring about that change.

The GSM based announcement system is to design unit that can communicate wirelessly over a large dimension. The GSM modem is installed with a solar panel and a speaker at the required place. When the user wants to address something, he or she would call on the SIM fitted on the GSM. The SIM receives a call from the mobile phone and the call data is extracted by Microcontroller from the GSM modem and the call is connected. Now the user can communicate or make an announcement. This proposed system can

be employed in many applications like educational institutions, organizations, traffic management, railways announcements, advertisements, large industries, etc. Being a user friendly, long range and fast product means conveying information are major strengths of this application. Another feature of this system is that only a registered number can call this unit. Unauthorized numbers are not answered by the system

II. LITERATURE REVIEW

Huynh D.C & ET. All. Maximum power point tracking of solar photovoltaic panels using advanced perturbation and observation algorithm. IEEE June 2013.

This paper proposes an advanced perturbation and observation (P&O) algorithm for tracking the maximum power point (MPP) of a solar PV panel. Solar PV cells have a non-linear V-I characteristic with a distinct MPP which depends on environmental factors such as temperature and irradiation. In order to continuously harvest maximum power from the solar PV panel, it always has to be operated at its MPP. The proposed P&O algorithm can reduce the main drawbacks commonly related to the P&O algorithm. This is achieved with determining the short-circuit current before each perturbation and observation stage. The obtained simulation results are compared with MPPs achieved using the conventional P&O algorithm under various atmospheric conditions. The results show that the advanced P&O algorithm is better than the conventional P&O algorithms for tracking MPPs of solar PV panels. Additionally, it is simple and can be easily implemented in digital signal processor (DSP). [1]

Grzesiak. W. MPPT Solar Charge Controller for High Voltage Thin Film PV Modules. IEEE May 2006.

The work deals with a PV battery charge regulator assigned for advanced CdTe modules of output voltage much higher than the popular values of the order 12 or 24 V nominally. As at the same time most of the nominal PV autonomous installation voltages generally remain on the 12 or 24 V level because of convenience, technical tradition and battery features- this high DC module's voltage has to be transformed to a proper lower value by means of DC/DC inverter of possibly high efficiency. A new own developed 60/12 V charge controller solution is presented. This charge controller is equipped with a "step-down" inverter version furnished with modern MPP tracking technique. The choice of MPPT algorithm and its realization by means of microprocessor are explained and discussed as well as final test and

measurement results. Very satisfactory exploitation results permit to estimate the solution as a valuable one for the new high voltage modules' market.

Petchjatuporn. P and ET. All. A Solar-powered Battery Charger with Neural Network Maximum Power Point Tracking Implemented on a Low-Cost PIC-microcontroller. IEEE Nov 2005.

This paper presents the development of a maximum power point tracking algorithm using an artificial neural network for a solar power system. By applying a three layers neural network and some simple activation functions, the maximum power point of a solar array can be efficiently tracked. The tracking algorithm integrated with a solar-powered battery charging system has been successfully implemented on a low-cost PIC16F876 RISC-microcontroller without external sensor unit requirement. The experimental results with a commercial solar array show that the proposed algorithm outperforms the conventional controller in terms of tracking speed and mitigation of fluctuation output power in steady state operation. The overall system efficiency is well above 90%. [3]

Longxi. Chang & ET. All. A fully integrated solar charger controller with input MPPT regulation protection for 10V to 28V solar-powered panel. IEEE June 2013.

A fully integrated solar charger controller is presented in this paper. The charger has wide input voltage range about 10V to 28V for the solar-powered panel. The input loop regulation is used here as the MPPT protection. This charger also provides different kinds of battery voltages about 4V to 12V. The controller system uses just one error amplifier and no external compensation components is needed. Besides, this controller has 600 kHz PWM modulation and offers the over-current/overvoltage protection. Other components like bandgap, reference generator, saw-tooth generator, register controller and driver circuits are all implemented in this circuit. This chip is fabricated in a 0.4- μ m 5V/40V 2P4M process. The power consumption of this full-integrated solar charger controller IC is about 10mA. [4]

III. METHODOLOGY

The GSM based announcement system is to design unit that can communicate wirelessly over a large dimension. The GSM modem is installed with a solar panel and a speaker at the required place. When the user wants to address something, he or she would call on the SIM fitted on the GSM. The SIM receives a call from the mobile phone and the call data is extracted by Microcontroller from the GSM modem and the call

is connected. Now the user can communicate or make an announcement. This proposed system can be employed in many applications like educational institutions, organizations, traffic management, railways announcements, advertisements, large industries, etc. Being a user friendly, long range and fast product means conveying information are major strengths of this application. Another feature of this system is that only a registered number can call this unit. Unauthorized numbers are not answered by the system.

3.1.1 GSM: Global System for Mobile Communication:

GSM is the world's first cellular system to specify digital modulation and network level architectures and services.

The GSM Modem can accept any SIM card and act just like a mobile phone with its own unique phone number. GSM networks operate in 900MHz or 1800MHz bands while most 3G networks operate in 2100MHz frequency band.

3.1.2 GSM Services and Features:

GSM is used in our project to send live condition of water level in river and send to authorized person.

GSM services follow ISDN guidelines and are classified as either tele-services or data services. Teleservices include standard mobile telephony and mobile-originated or base-originated traffic; Data services include computer-to-computer communication and packet-switched traffic. User services may be divided into three major categories:

1. Telephone Service
2. Bearer services or data services
3. Supplementary ISDN services

GSM provides mainly two features:

1. SIM (Subscriber Identity Module)
2. On-the-Air Privacy [3]

3.1.3 SIM800:

SIM800 is a complete Quad-band GSM/GPRS solution in a SMT type which can be embedded in the customer applications. It works on frequencies GSM 850MHz; EGSM 900MHz, DCS 1800MHz and PCS 1900MHz. SIM800 features GPRS multi-slot class 12/ class 10 (optional) and SIM800 is a complete Quad-band GSM/GPRS solution in a SMT type which can be embedded in the customer applications. It works on frequencies GSM 850MHz; EGSM 900MHz, DCS 1800MHz and PCS 1900MHz. SIM800 features GPRS multi-slot class 12/ class 10 (optional) and supports the GPRS coding schemes CS-1, CS-2, CS-3 and CS-4. SIM800 can meet almost all the space prerequisite in users' applications, such as

M2M, smart phone, PDA and other mobile devices. SIM800 is designed with power saving technique so that the current consumption is as low as 1.2mA in sleep mode. SIM800 integrates TCP/IP protocol and extended TCP/IP AT commands which are very useful for data transfer applications. [5] SIM800 support Quad-band 850/900/1800/1900MHz, it can transmit Voice, SMS and data information with low power consumption. With tiny size of 24*24*3mm, it can fit into slim and compact demands of customer design. Featuring Bluetooth and Embedded AT, it allows total cost savings and fast time-to-market for customer applications. [6]

3.1.4 Arduino:

Arduino is used for programming propose that will get input from float sensor and send to GSM system.

Arduino is an extensible programmable hardware platform designed for artists, coders, designers, tinkerers and the makers of things. The Arduino development environment is a program based on the processing development environment that you use to write, edit, compile, and upload your Arduino source code to the interface board. It contains Arduino-specific commands that are easier to use and easier to understand, and built right into every sketch ever written. [7] Arduino projects use .pde files and .c files. They are actualized using a compiler. A compiler is a program that takes a code file and turns it into a series of instructions that a computer will run as a program. The compiler optimizes machine instructions for the computer to run very quickly [8]. Most of the Arduino code is performed using Arduino C language, which is a mixture of high level programming languages like C, C++, and in special cases JAVA.

3.1.5 MCU:

The MPPT control circuit is implemented in a microcontroller, that has eight 10-bit analog-to-digital (A/D) converters and two four PWM mode signals. The buck converter is controlled by the microcontroller. It read the voltage and current of the solar panels through the A/D port of controller and calculates the output power. It also calculate power by reading the voltage and current of battery side in same way and send corresponding control signal to the buck converter and control the duty cycle of the converter by PWM signal through controller to accordingly increase, decrease or turn off the DC to DC converter. The avr is a perfect combination of performance, features, and low power consumption for this application. The control circuit compares the PV output power before and after a change in the duty ratio of the DC/DC converter control signal. It is expected that

the MPP presents a constant oscillation inherent to the algorithm.

3.1.6 DC-DC convertor:-

There are several topologies available for DC-DC converter. Among them buck converter is in an increasingly popular topology, particularly in battery powered applications, as level of the output voltage can be changed with respect to input voltage. The commonly used a converter in PV systems is a DC/DC power converter. It ensures, through a control action, the transfer of the maximum of electrical power to the load. The structure of the converter is determined according to the load to be supplied. In this article we focus on the step-down DC/DC converter (Buck converter). MPPT uses the same converter for a different purpose, such as regulating the input voltage at the Maximum power point and providing load matching for the maximum power transfer.

3.1.7 Mppt:

A typical solar panel converts only 30 to 40 percent of the incident solar irradiation into electrical energy. Maximum power point tracking technique is used to improve the efficiency of the solar panel. According to Maximum Power Transfer technique, the output power of a circuit is maximum when the source impedance matches with the load impedance. In the source side a buck converter is connected to a solar panel in order to enhance the output voltage. By changing the duty cycle of the buck converter appropriately by PWM signal the source impedance is matched with that of the load impedance. There are various MPPT techniques are proposed. Among those methods, the perturb and observe (P&O) and incremental conductance (INC) methods are widely used although they have some problems such as the oscillation around MPP and confusion by rapidly

changing atmospheric conditions.

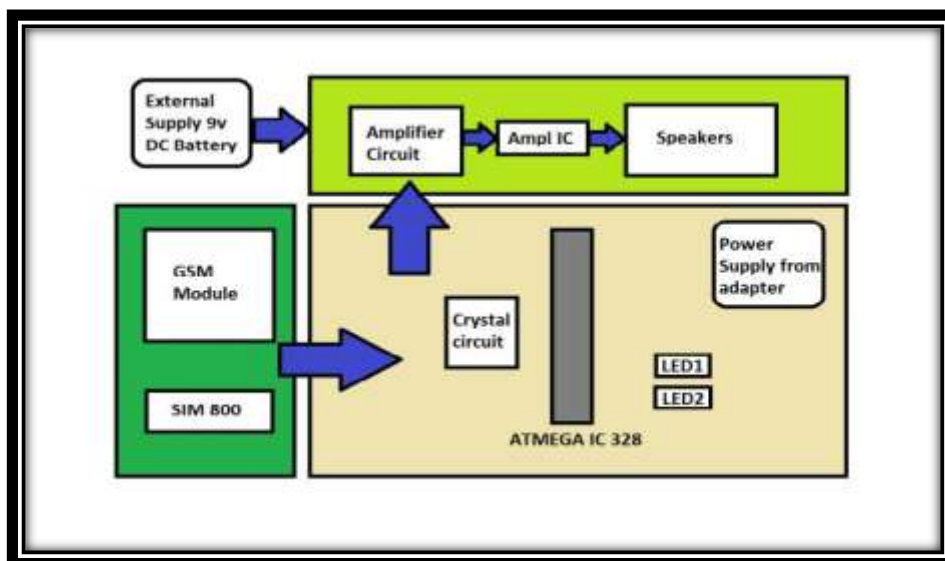
In this proposed system perturb and observe MPPT algorithm is used. In this method the controller adjusts the voltage by a small amount from the array and measures power, if the power increases, further adjustments in the direction are tried until power no longer increases. This is called P&O method. Due to ease of implementation and cost effectiveness, it is the most commonly used MPPT method.

The voltage to a cell is increased initially, if the output power increase, the voltage is continually increased until the output power starts decreasing. Once the output power starts decreasing, the voltage to the cell decreased until maximum power is reached. This process is continued until the MPPT is obtained. This result is an oscillation of the output power around the MPP. PV module's output power curve as a function of voltage (P-V curve), at the constant irradiance and the constant module temperature, assuming the PV module is operating at a point which is away from the MPP.

This P&O algorithm periodically increment or decrement the output terminal voltage of the PV cell and comparing the power obtained in the current cycle with the power of the previous one. If the power is increased, then it is supposed that it has moved the operating point closer to the MPP. Thus, further voltage perturbations in the same direction should move the operating point toward the MPP. If the power decreases, the operating point has moved away from the MPP, and the direction of perturbation should be reversed to move back toward the MPP.

3.1.8 EnergyStorage: It is used for store energy coming from solar panel. Storage device is 12v lead acid dry battery.

System Architecture:



IV. CONCLUSION

The project requires the system to detect the user phone number, acknowledge the registered number and reject other numbers calling the GSM. This circuit uses AT mega 328 IC for running the code used to implement its function as said above, the GSM SIM800 module, Amplifier circuit consisting of LM386 IC, and Speakers for making the announcement.

The SIM 800 is fitted with a SIM card. The code is stored in ATMEGA 328 IC and implemented by it. The code's function is to check the number calling on the device, checking whether the number calling on it is registered number or not. If it's not the registered number then the call is not picked up or rejected. However, if the call is from the registered number then the call is automatically picked up. The caller can now talk on their mobile handset or calling device and the voice is amplified by an amplifier and sent to the speaker, which produces a high decibel sound which can now be announced to the public. The intensity of sound depends on the amplifier used. After the call is over the circuit goes back to normal state and waits for another call. The code is implemented every time a call is made.

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