

Solar Base LED Schlooring Display

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Abstract: *The development of solar energy and the LED display, the superiority of the combination of them and software design of the system are discussed in this paper. Hardware design and software design are the key elements of this paper. Solar control circuit, LED display control circuit, etc are described, charge and discharge of the battery and output of the battery is controlled by Arduino IDE. The design of software provides driver to the related hardware circuit. The result of the experiment have achieved anticipate defects and met the design requirements. The aim of this paper is to design a textual display system, based on a light emitting diode (LED) dot matrix array powered by solar energy. The paper involves taking the device from an initial concept, through a design phase, to constructing a prototype of the product. The system consists of the display unit, which is powered from a photovoltaic (PV) module and a solar sealed lead acid battery.. The self-contained nature of the intended design will allow the display to be mounted almost anywhere it is needed. Therefore, the main purpose of this paper is to utilize the solar energy and a rechargeable battery to power a universal self-contained characters display unit. This display unit is useful for creating attention-getting messages, location identifiers such as maps and address identification display modules.*

Keywords: Solar cells, microcontroller, moving message unit, PV sizing and charge controller

I. INTRODUCTION

The resources for the subsistence of the mankind is largely consuming, some of which are nearly used up. In order to protect the geo-environment and the ecology which we live on with exploiting and using the energy resource, all countries of the world have chosen the sustainable energy development strategies. Solar energy will become the new energy industry, the key development areas of development planning. Solar photovoltaic is one of the fastest growing industry of the world. In the last five years, the production of photovoltaic cells has increased steadily at an average rate of 40% per year in the world, which exceeds the development of IT industry. As a clean and renewable energy, the rapid development of the world's new energy, one of the most important direction of development. Solar energy generation industry comes into shape rapidly. The resources for the subsistence of the mankind is largely consuming, some of which are nearly used up. In order to protect the geo-environment and the ecology which we live on with exploiting and using the energy resource, all countries of the world have chosen the sustainable energy development strategies. Solar energy will become the new energy industry, the key development areas of development planning. Solar photovoltaic is one of the fastest growing industries of the world. In the last five years, the production of photovoltaic cells has increased steadily at an average rate of 40% per year in the world, which exceeds the development of IT industry. As a clean and renewable energy, the rapid development of the world's new energy, one of the most important direction of development. Solar energy generation industry comes into shape rapidly. In recent years, more and more electronic display has been applied in many fields. It can show the changing numbers, words and graphic images. It can be used not only in the indoor environment but also in the outdoor environment, is an ideal outdoor information display media which can display text, images, two-dimensional and three-dimensional animation content has the many advantages over the projector, TV wall and LCD screen. LED panel is one kind of public information display monitor. It will be the most Microgrid display technology in the areas of display. Solar energy can provide power for electronic displays. As a kind of the ideal public information display media, electronic display may broadcast video signal and the demonstration writing, the image such as television, video recording, VCD

and so on directly. There will be a great future if we integrate solar energy utilization techniques into electronic display techniques. The combination of them produced a individual equipment that can work in many inconveniences conditions, Remote control can make screen display control more convenient and timely, changing information can move more quickly to provide convenience for the people. The solar energy power supply large and efficient use of energy saving, under cloudy conditions battery can ensure the equipment to run regularly. In places far away from civilization, such as highway, remote scenic area, The electronic display using the solar energy power supply set up bulletin boards, billboards to transfer information in time, Also low cost of investment and environmental protection give people a kind of the way that we need life--Low carbon, energy conservation, environmental protection. In this paper, After studying the principle of large number of electronic display screen, LED display based on solar energy will be designed.

II. OBJECTIVES

LED display based on solar energy can be divided into three parts, the control part, battery and LED display part. Solar control principle and design system include solar energy voltage measurement, battery charging condition and the control of charge and discharge, solar controller is key of controlling the entire system state. General solar plate output voltage is not stable, must be convert into electrical energy stored in the storage device, cannot be applied to the load directly. Solar energy controller plays a leading role, in the process; its performance will affect the use effect of practical application. Solar controller will control battery charge and discharge in order to pro long the service life of the battery, the controller must limit charge and discharge conditions in order to prevent the battery overcharge or deep charging.

1. Using renewable energy sources, the Photovoltaic solar energy, in one of the terrestrial applications (Moving message display).
2. Using Atmel Microcontroller to input, store, control and output the data for the message characters on a dotmatrix.
3. Design and realizing the moving message display panel.

III. PROPOSED FRAMEWORK

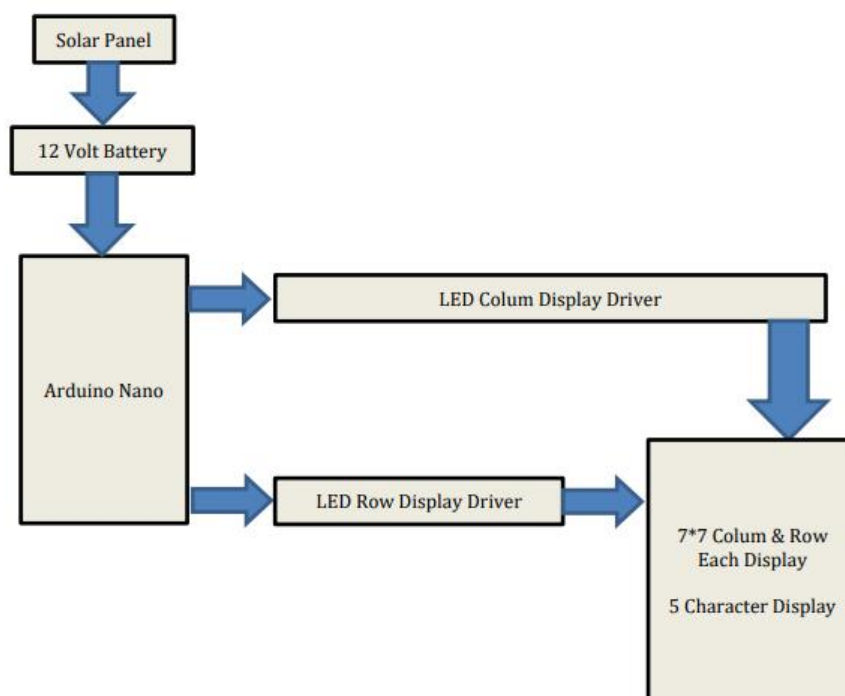


Fig.1 Block Diagram

LED display is consisted of control system, drive system and display device. The microprocessor control system is the core of the entire screen, which is responsible for display on electricity self-inspection and accepting information sent from PC to parse the content of agreement, according to analysis the content of the agreement to reorganize the relevant data of the agreement in order to send the right timing to drive control signal. After driver accept sequential control signal, it will drive the corresponding LED device to be the lighting or extinguishing. That will show variety of graphic left, up, down, left shutter shade, right, left or right shutters and other display effect, the PC will send correlating commands when it's time to replace them. As a main control system, LED display control system is required to implement the following functions: 1.static and dynamic debugging. Chinese and graphic displaying functions, that can display any Chinese and a certain amount of graphic and modified by upper computer 2.The display mode control: Chinese characters or graphic can be achieved on left shift, promptly jump in, jump flashing, roll up into, roll down into, middle Roller shutter, left Roller shutter, right Roller shutter, both Roller shutter, left shutter, right shutter. line-by-line wipe up, line-by-line wipe down and other functions.

IV. LITERATURE REVIEW

Xuefeng BAI, Hanqing LI, (2015) designed and developed a GSM based multiple LED display boards using AT89S52 microcontroller, GSM module. LCD and several moving LED displays. Multiple moving LED displays were connected via different GSM modules at different geographical locations such that the same SMS sent was displayed on all the moving LED displays. Though with few limitations, this work proved to be cost-effective, secured and efficient as compared to previous works.

Prof. Prasanna Titarmare,(2020) designed adual axis sun tracking for solar pv modules with an automated cleaning system which not only track sun but also clean the solar PV module automatically.

Avhadet,al (2016), also presented a paper on Real Time Digital Notice Board using Cloud Platform The proposed system will enable people to wireless transmit notices on a notice board using Bluetooth with smart phone and users get auto notification using parse cloud. Its operation is based on micro controller ATMEGA 328P Programmed in C language.

V. FLOWCHART

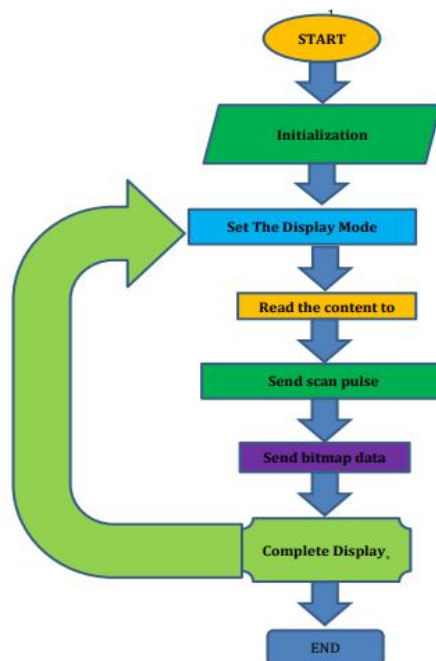


Fig.2 Flowchart

VI. WORKING PRINCIPLE

LED display based on solar energy can be divided into three parts, the control part, battery and LED display part. Solar control principle and design system include: solar energy voltage measurement, battery charging condition and the control of charge and discharge, solar controller is key of controlling the entire system state. General solar plate output voltage is not stable, must be converted to electrical energy stored in the storage device, cannot be applied to the load directly. solar energy controller plays a leading role, in the process, its performance will affect the use effect of practical application. Solar controller will control battery charge and discharge in order to prolong the service life of the battery, the controller must limit charge and discharge conditions in order to prevent the battery overcharge or deep charging.

VII. CONRTOLLONG OF CHARGING

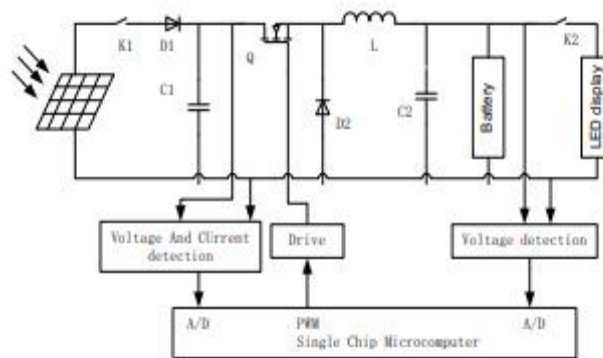


Fig.3 Solar electronic display control system structure diagram

In this design, the tandem type controller are selected, switch is connected between the solar cell phalanx and battery in series, Charging circuit is disconnected when the battery is full .Series switch can be used to replace the recoil diode to cut off the photovoltaic phalanx in night. Switch K1 is connected to the output of the solar cell phalanx in series. When the battery voltage is greater than the full cut off voltage, K1 will be shut down, solar panels are no longer charge to battery. Overcharge protection prevents harm to battery. As recoil diode, only when the solar cell phalanx output voltage is greater than the battery voltage, D1 will be conduction, whereas D1 ended, so as to ensure no battery will reverse discharge to solar cell phalanx back in night or rainy weather. PWM (pulse width modulation) charging method have been chosen in this paper, It is a very effective technology that microprocessor digital output is used to control analog circuits, widely used in measurement, communication , power control and transform in many areas. MOSFET and IGBT, the continuous improvement of controlling device, that provides PWM control technology a great foundation to promote the rapid development of the technology, have been widely applied to AC/DC, DC/DC, AC/AC, DC/AC four kinds of PWM modulation way is charging battery for a period of time, and then let the battery stop charging for a period of time, such a cycle. Oxygen and hydrogen produced by the chemical reaction have time to re-organize to be absorbed, so as to reduce the battery internal pressure, make the next charging more smoothly, the battery can absorb much more power and improve the efficiency of the battery.

VIII. FUTURE SCOPE

This program mainly includes three parts: main program, display subroutine, delay subroutine. The main program mainly complete the whole hardware system initialization, mainly including the I/O port definition and initialization, each parameter used in the program setting and definition. Call the font program and delay in turn. Display subroutine will save the bitmap data storage sequentially and line scan to remove line by line light LED. Chinese characters display on a screen, cycle show a period of time, lattice address offset 32 bytes, then show the next screen data. In the data, must think about the Chinese character modulus principle, 16*16 display has row and column two kind of modulus, here is the latter. According to the modulus, first call font program, then, each hexadecimal will be send out, first call the upper part of each column.

IX. CONCLUSION

Hardware design and software design are the key elements of this paper. Hardware includes signal acquisition circuit, solar control circuit, alarm circuit, electronic display screen circuit, etc. It controlled by Arduino Nano, MAX232 is used in communication system hardware design and using triode to control battery and output of the battery. The aim of the design of software is primarily to provide driver to the related hardware circuit, mainly are data acquisition program, serial communication program and the solar circuit control procedures. Programming environment uses the Arduino IDE & Proteus Simulation development environment and Programming language uses the C language. The result of the experiment meets the design requirements on the whole, making the solar charging and electronic display output come true. The result shows that not only can improve flexibility of system, it also has obvious energy-saving and environmental protection effect.

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