Solar Powered Wireless Display

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Abstract

It is becoming essential to increase the use of renewable energy sources namely solar energy as compared to conventional sources of energy generation [6]. Bulletin boards play an important role in communicating any message with the advent of digital technology. Effectively present information about digital devices. The use of digital media rather than the use of traditional media such as paper printing is essential. This project is mainly related to Bluetooth& Solar Power, I have an Android application that connects to a LED display via Bluetooth. Messages received via Bluetooth are sent to the microcontroller and displayed on the bulletin board. The billboard and LED display connected to the microcontroller are powered by a regulated 230V AC power supply and solar energy.

Keywords : LED Display, Solar energy, AC power supply

Introduction

Traditionally, bulletin boards are for posting information, but posting various notices every day requires a complex process and more time. To solve this problem, there is a project dedicated to the innovative wireless solar technology bulletin board. A system consists of software and hardware. The software area includes developing code algorithms for Android Bluetooth applications and microcontrollers to receive and display notifications on graphical dot matrix displays. In this project, we used AVR studio software for coding and ProgISP software for uploading code to the microcontroller. The hardware area includes the development of receiver hardware using the Atmega328 microcontroller, a configuration of two modules. The development system reflects the minimum requirements to implement a wireless bulletin board. This digital bulletin board project is to design a mobile message scrolling display for a bulletin board. This scrolling display consists of dot matrix LEDs. Mobile Android can be used to change the display of the bulletin board. This project uses Bluetooth technology to extend the display. Here we used solar energy as solar energy that is stored in a battery and fed to a dot matrix display. For this project, there is another way to power it from 230V AC. Each time the power is turned on, the system will show a default message on the LED display. Whenever the user needs to change the message on the bulletin board, the user must enter the message into an application installed on the Android mobile device and send it to the microcontroller using Bluetooth technology.

Literature Review

Priyanka. M, Bavithra, N and Ramya, R. (2018) (2013) designed an SMS driven automatic display using ARM-LPC2148 to interface multiple graphical display. With this technology, a single notice could be sent to several e-notice boards via ARM-LPC2148[1].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[2].Prof. PrasannaTitarmare, KomalChoudhary, HarshadaKawale, SagarNavghare, SwapnilBendre (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 moduleautomatically [5].

ModiTejalPrakash, kureshiNoshinAyaz, OstwalPratikshasSumtilal (2017) proposed development of GSM based digital notice board. The complete system would have a dual system in terms of changing message display, dual power supply switchable between solar power system and alternating current (AC) from the utility supply and inbuilt motion detector that could automatically switch OFF the whole system after working hours and would automatically switch ON if any motion sensed by the motion detector after the programmed working hours. This work would probably prove highly efficient in terms of ensuring better communication and continuous power supply[3].

Block diagram

The block diagram shows the wireless notice board consists of solar panel, solar controller, ARDUINO UNO board and Bluetooth module. Solar panel is used to charge the battery through solar controller. The wireless communication is done through Bluetooth module. The android app serial terminal is used to control the LED Board through this application. The range of control is around 30 feet typically. The LED P10 board is consists of array of LEDs. The LED board runs on 12 volt battery. The ARDUINO BOARD required 5volt to initialize board. The Solar controller will be connected to the solar panel as well as battery as load. Solar controller will charge the battery through solar panel. A P10 LED Display Module is the most suitable for designing any size of outdoor or indoor LED display advertisement board. This panel has a total of 512 high brightness LEDs mounted on a plastic housing designed for best display results. Any number of such panels can be combined in any row and column structures to design an attractive LED signboard. The 32*16 module size means that there are 32 LEDs in each row and 16 LEDs in each column. So there is a total of 512 numbers of LEDs present in each module unit.
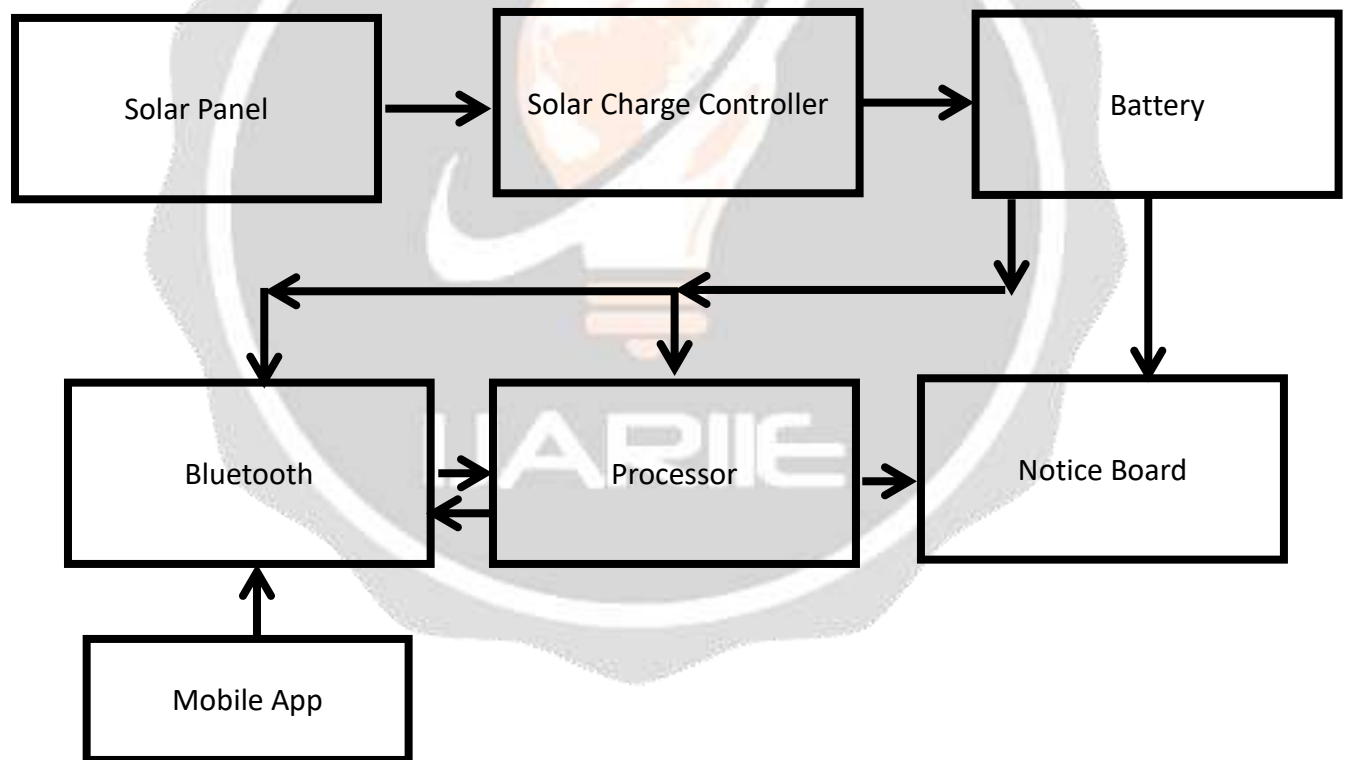

Circuit diagram

The ARDUINO UNO and P10 display modules are interconnected as per the pin mapping are shown below:

P10 LED Module	ARDUINO UNO
ENABLE	9
A	6
B	7
CLK	13
SCLK	8
DATA	11
GND	GND

- **Enable:** This pin is used to control the brightness of the LED panel, by giving a PWM pulse to it.
- **A, B:** These are called multiplex select pins. They take digital input to select any multiplex rows.
- **Shift clock (CLK), Store clock (SCLK) and Data:** These are the normal shift register control pins. Here a shift register 74HC595 is used.

After the successful completion of the hardware setup, now it's time to program ARDUINO.
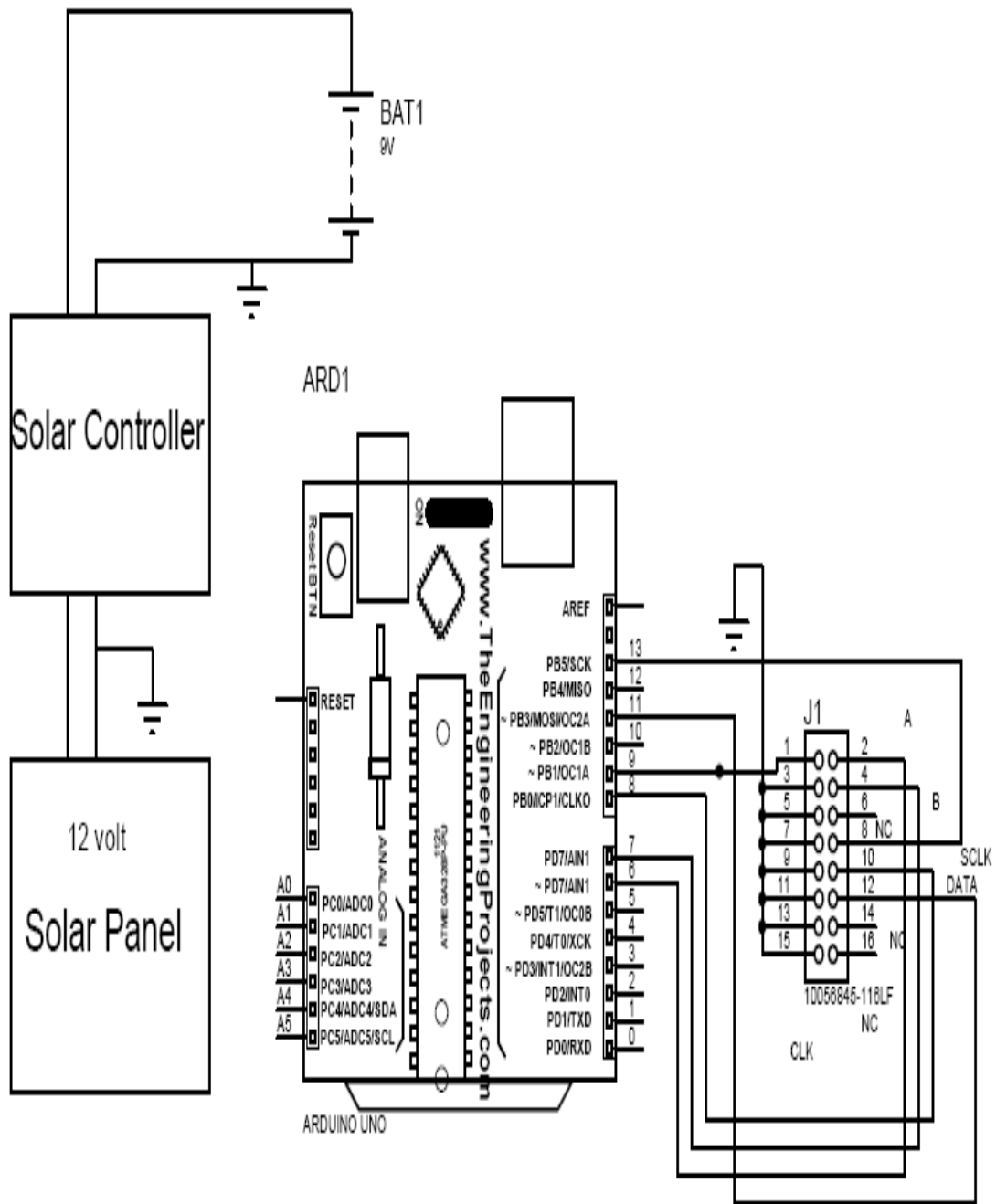
Hardware and Software

ARDUINO UNO

ARDUINO is a prototype platform (open-source) based on an easy-to-use hardware and software. It consists of a circuit board, which can be programed (referred to as a microcontroller) and ready-made software called ARDUINO IDE (Integrated Development Environment), which is used to write and upload the computer code to the physical board.

The key features are −

- ARDUINO boards are able to read analog or digital input signals from different sensors and turn it into an output such as activating a motor, turning LED on/off, connect to the cloud and many other actions.

- You can control your board functions by sending a set of instructions to the microcontroller on the board via ARDUINO IDE (referred to as uploading software).

- Unlike most previous programmable circuit boards, ARDUINO does not need an extra piece of hardware (called a programmer) in order to load a new code onto the board. You can simply use a USB cable.

- Additionally, the ARDUINO IDE uses a simplified version of C++, making it easier to learn to program.

- Finally, ARDUINO provides a standard form factor that breaks the functions of the micro-controller into a more accessible package.

Bluetooth communication between Devices

E.g. Send data from Smartphone terminal to HC-05 Bluetooth module and see this data on PC serial terminal and vice versa.

To communicate smartphone with HC-05 Bluetooth module, smartphone requires Bluetooth terminal application for transmitting and receiving data. You can find Bluetooth terminal applications for android and windows in respective app. store.
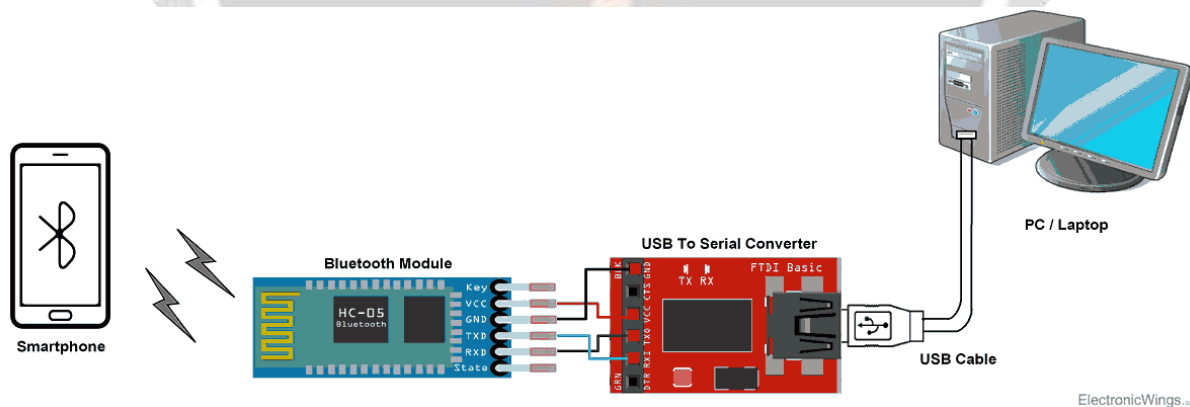
Bluetooth Module Serial Interface

So, when we want to communicate through smartphone with HC-05 Bluetooth module, connect this HC-05 module to the PC via serial to USB converter.

Before establishing communication between two Bluetooth devices, 1st we need to pair HC-05 module to smartphone for communication.
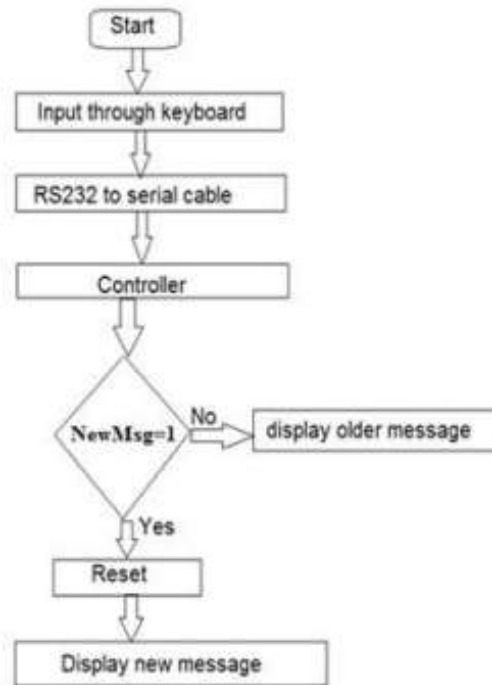
Fig. Flow chart of operation

The System is working perfectly after applying the 12 volt battery. For this project the battery of 12 volt and 1.2aph is used. For more brightness for led, the more powerful battery can be used. The solar panel of 30 watt is used to charge the battery through solar controller to the battery. ARDUINO UNO is used to connect the P10 LED Board. The programming is done through ARDUINO IDE. The language used is C++ language. The system is tested with the Multi meter. The Voltages required for the system is maintained through 12 volt battery. The Serial Terminal software is used to control the notice board through Bluetooth. The mobile has to search for the Bluetooth connection with the notice board. When the pairing is done with the notice board, the user can send the text as per his wish.

Conclusion:

As technology advances every day, scoreboard systems are moving from traditional handwritten displays to digital displays. Go to Wireless Display. In this project, a laboratory phototype sample of a wireless bulletin board connected with a Wi-Fi module is being developed, and a message desired by the user is displayed via SMS in the most congested or congested place. By developing Android applications according to this proposed methodology, we can not only improve our security system, but also inform about emergencies and avoid many risks. Acknowledgments The authors would like to thank the management of the MLR Institute of Technology for their support.

Results

In this project, we are going to develop a digital bulletin board. Here we will provide the entrance to the bulletin board from the personal computer. Here we are basically doing serial communication through the MAX233 which converts the signal from the RS232 serial port to a signal suitable for TTL compatible logic circuitry. It usually converts Rx, Tx, CTS and RTS signals. For this project, I used a PIC 18f2550 microcontroller. It has 2048 bytes of SRAM and 256 bytes of EEPROM. This controller provides a good means of serial communication. Here we design

our handmade display boards. We develop 5 8*8 matrices on this board. Send 256 emails at a time. Here we are designing a scroll board where messages are scrolled using IC 78Hff shift registers. The columns of each matrix are linked to a shift register, so the message moves horizontally from left to right. I also needed a ULN2803 for current control that acts as a current sink capable of sinking 500mA of current.

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