International Journal of Advance Engineering and Research Development (IJAERD)
Volume 1,Issue 5,May 2014, e-ISSN: 2348 - 4470 , print-ISSN:2348-6406

Design Module For Data Transfer Between Bluetooth Device And Flash Drive Using USB Host Controller

Harpreet Singh[1] , Kamaldeep Kaur[2]

[1]*Department of Electronics,Baba Banda Singh Bahadur Engineering College, Fatehgarh Sahib, Punjab (India) , harpreetsngh70@gmail.com*
[2]*Department of Electronics,Baba Banda Singh Bahadur Engineering College, Fatehgarh Sahib, Punjab (India) , kamaldeep.kaur@bbsbec.ac.in*

Abstract— In the modern world no one can refuse the popularity of UNIVERSAL SERIAL BUS (USB) storage device. Drawback of USB device is that being a peripheral device, it needs a host usually a PC to initiate and mediate communications between two USB storage devices. This module provides the platform such that two USB can communicate directly without PC. This module uses a chip named as VDIP2 embed with VNC1L host controller further interfaced to microcontroller. USB device directly connected to the port on VDIP2 chip. When USB is inserted into the port then VDIP2 sends a signal to microcontroller to inform that first USB inserted. Then controller waits for signal from other port. After the reception of signal controller is ready to transfer the data between USB's. There is also a Bluetooth module that enables the module to connect with any wireless device such as mobile, laptop. With the help of this Bluetooth module device is able to send data wirelessly. Data can be transfer in either direction from USB device to Bluetooth device or from Bluetooth device to USB device. Only controller can get the input from the external hard key from the user, once the user press the hard key then controller gets the information to transfer the data between two USB devices or with Bluetooth Device. For the interaction of user there is keypad and graphical LCD. User can select the appropriate operation from options with the help of keypad.

Keywords — AVR; Bluetooth; USB; VDIP2; VNC1L

I. INTRODUCTION

Several data and applications are developed daily which common computer user has to transfer from one USB Flash device into another, with the minimum wastage of time. For this user has to first find a computer then wait for it to boot up, then plug in his device, and then transfer the data. . If data transfer is the only purpose for doing this then it seems very time consumable and wastage of power. Carrying a computer or a laptop just for the sake of data transfer is not affordable these days in the age when people want all devices to be handy. So to overcome this problem a module has been designed which can transfer data between pendrives and with any Bluetooth device. In the module to provide platform for USB a chip named as VDIP2 is used. This chip uses the VNC1L host controller to host the USB devices. VDIP2 is interfaced with ATMEGA32 microcontroller such that various task can be performed. VDIP2 provides the full access to VNC1L means all the ports and other pins directly accessible with the help of VDIP2. VNC1L operates in different modes and support many firmware. VDIP2 has two USB female ports where USB devices directly inserted. When a USB device is inserted in the port then a signal is sent to the microcontroller which informs that USB device is inserted. Then controller waits for the signal from other port or from Bluetooth device. As the controller receives the signal from the other port or from the Bluetooth device, controller is ready to

transfer the data either between USB devices or with the Bluetooth device. The user can see the data on LCD and control the various operations using keypad.

II. LITERATURE REVIEW

1. IEEE paper published by Zhang Xiaoyan and Tie Yong in 2010 titled "Design and Realization of an embedded storage system based on LPC2387 microprocessor"
2. V.S. Gawali and A.M. Agarkar had presented their data entitled "Pen Drive to Pen Drive and Mobile Data Transfer Using ARM" in Second International Conference on Emerging Trends in Engineering (SICETE) which was conducted by College of Engineering, Jaysingpur and published their data in IOSR Journal of Electronics and Communication Engineering, PP: 43-47
3. J. Ducloux, P. Petrashin, had published their paper in IEEE in 2012 titled by an Embedded USB dual role System Integrated for mobile devices
4. Subhash Suman and A. A. Shinde had published their data in International Journal of Emerging Technology and Advanced Engineering (2013) which was entitled "Data Transfer Between Two USB Disk Without Use of Computer"

III. METHODOLOGY

Objective of this module is to transfer the data between USB devices or with the Bluetooth device. To provide the platform for USB devices VDIP2 named chip is used which uses the VNC1L host controller. VNC1L support six different firmwares. VDIP2 is preloaded with VDAP firmware, but this firmware support only one USB device at a time. Our requirement is to insert two USB devices at a time so this firmware is updated to VDFC firmware. Now mode of communication is set to UART mode .To set the mode of communication there is two jumpers on the VDIP2 chip. A Bluetooth module is interfaced with microcontroller in UART mode to connect with Bluetooth device. To do specific task on the module a proper set of commands is send to the VDIP2 from microcontroller. User can interact with the module through keypad and select the desired action from the list displaying on the displaying unit.

IV. HARDWARE DESCRIPTION

To perform the operation of data transfer different blocks are interconnected with each other. The block diagram of this is given as:-

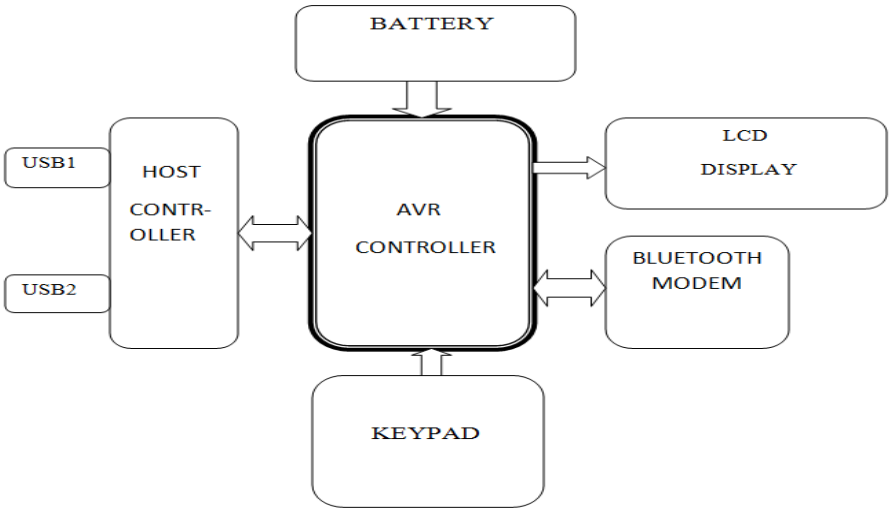


FIGURE 1. BLOCK DIAGRAM

The main components of this block diagram are AVR controller, Graphical LCD, Bluetooth module, VDIP2 module, VNC1L host controller.

4.1. AVR CONTROLLER

In the module to control the communication ATMEGA 32 controller is used.

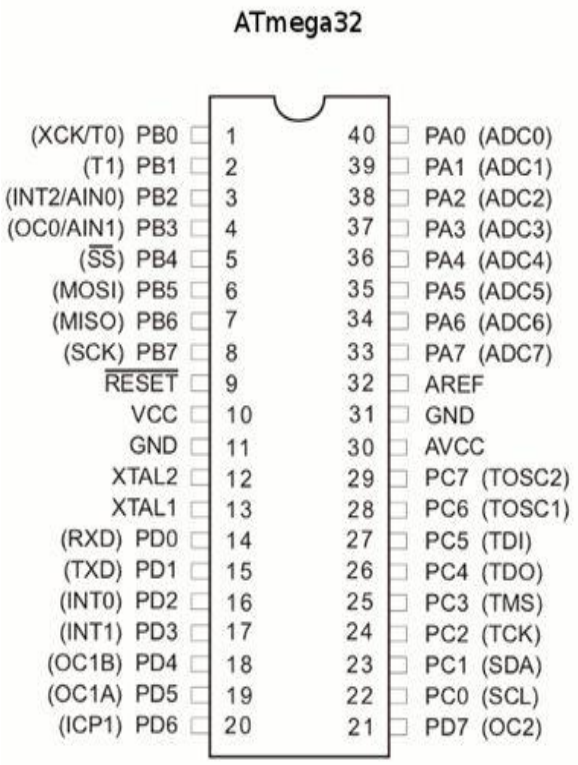


FIGURE 2. AVR CONTROLLER

The high-performance, low-power Atmel 8-bit AVR RISC-based microcontroller combines The ATmega32 provides the following features: 32Kbytes of In-System Programmable Flash Program memory with Read-While-Write capabilities, 1024bytes EEPROM, 2Kbyte SRAM, 32 general purpose I/O lines, 32 general purpose working registers, a JTAG interface for Boundary scan, On-chip Debugging support and programming, three flexible Timer/ Counters with compare modes, Internal and External Interrupts, a serial programmable USART, a byte oriented Two-wire Serial Interface, an 8-channel, 10-bit ADC. The device supports throughput of 16 MIPS at 16 MHz and operates between 4.5-5.5 volts. By executing instructions in a single clock cycle, the device achieves throughputs approaching 1 MIPS per MHz, balancing power consumption and processing speed.

4.2. GRAPHICAL LCD 128x64

In this module graphical LCD 128x64 is used. This LCD has a display format of 128x64 dots. This LCD is divided into two equal halves with each half being controlled by a separate controller pins. This LCD involves paging scheme. Whole LCD is divided equally into pages.

1. 128x64 LCD implies 128 columns and 64 rows.
2. 128x64 LCD is divided equally into two halves and consists of 8 pages.

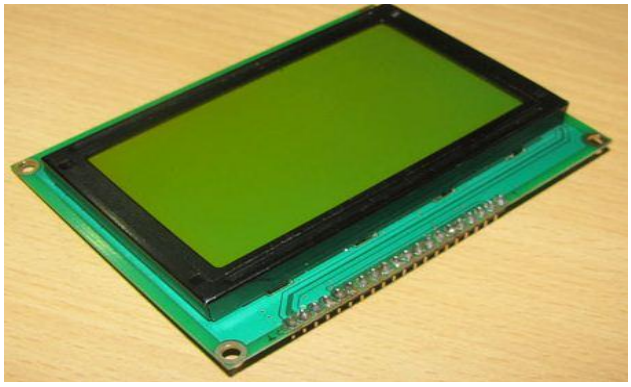


FIGURE 3. GRAPHICAL LCD

3. Each page consists of 8 rows and 64 columns.

4.3. BLUETOOTH MODULE

Bluetooth module is used to connect with Bluetooth device. Bluetooth Module is 5V Serial TTL. The module has built-in Voltage regulator and 3V3 to 5V level converter that can be used to interface with 5V Microcontrollers. The module has only 5 pins VCC, GND, TX, RX and RESET.

FIGURE 4. BLUETOOTH MODULE

The main features of the Bluetooth module are:-

1. Support Master & Slave Mode.
2. 5-Pin Standard Berg strip.
3. Serial Port Profile support.
4. Support UART interface to host system.
5. Serial communication at 9600-1152200bps.
6. Frequency 2.4~2.524 GHz.
7. 5V power supply.

4.4. VDIP2 MODULE

The VDIP2 module is an MCU to embedded USB host controller development module for the VNC1L IC device. The VDIP2 is supplied on a PCB designed to fit into a 40 pin DIP socket, and this module provides access to the UART, parallel FIFO, and SPI interface pins on the VNC1L device, via its AD and AC bus pins. These two pins are directly pulled up or pulled down by the jumper select pins on VDIP2 module. A 12MHz crystal oscillator provides on the chip itself and Traffic indicator LED is embedded on the PCB for each USB port. All other Vinculum I/O pins are also accessible.

FIGURE 5. VDIP2 MODULE

4.5. VNC1L HOST CONTROLLER

The VNC1L is the first of FTDI‟s Vinculum family of Embedded USB host controller integrated circuit devices. Vinculum can also encapsulate certain USB device classes handling the USB Host Interface and data transfer functions using the in-built MCU and embedded Flash memory. When interfacing to mass storage devices, such as USB Flash drives, Vinculum transparently handles the FAT File Structure using a simple to implement command set.

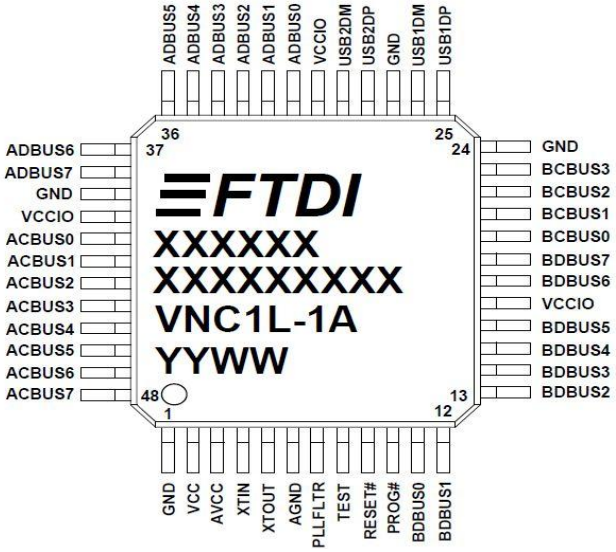


FIGURE 6. VNC1L HOST CONTROLLER

Vinculum provides a cost effective solution for introducing USB host capability into products that previously did not have the hardware resources to do so. The VNC1L has a Combined Interface which interfaces a controlling application with the Command Monitor. The combined interfaces are UART, Parallel FIFO and SPI. The VNC1L chip features an integrated 8/32-bit MCU and 64k embedded Flash memory. Not only does the chip handle data transfer functions on two USB Host/Client interfaces; it also encapsulates several USB device classes. One doesn't have to worry about writing firmware to implement those functions. When interfacing to mass storage devices such as USB Flash drives, the VNC1L transparently handles the FAT file structure communicating via UART, SPI or parallel FIFO interfaces via a simple-to-implement command set. The VNC1L device features two USB ports which can be individually configured by firmware as Host or Slave (client) ports.

V. SOFTWARE TOOLS

1) AVR studio
2) Extreme burner
3) Pony prog

VI. FIRMWARE SUPPORT

There are currently 6 standard firmware versions available for VNC1L:-

1)VDAP Firmware: USB Host for single Flash Disk and General Purpose USB peripherals. Selectable UART, FIFO or SPI interface command monitor.

2) VDPS Firmware: USB Host for single Flash Disk and General Purpose USB peripherals. USB Slave port connection for connecting to host PC. Selectable UART, FIFO or SPI interface command monitor.

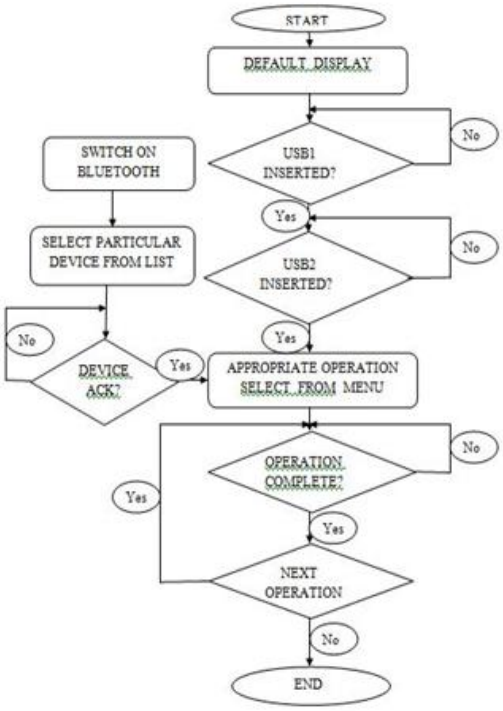
3) VDFC Firmware: USB Host for two Flash Disks, Selectable UART, FIFO or SPI interface command monitor.

4) VMSC1 Firmware: USB Host for single Flash Disk and General Purpose USB peripherals. Audio playback command extensions for VLSI VS1003 series MP3 decoder ICs. Selectable UART, FIFO or SPI interface command monitor port.

5) VCDC Firmware: USB Host for automatic connection to USB Communications Class Devices. UART interface command monitor.

6) VDIF Firmware: USB Host for single Flash Disk and General Purpose USB peripherals. Selectable UART, FIFO, SPI or USB interface command monitor.

VII. FLOW CHART



VIII. FUTURE SCOPE

With little modification in the module several new features could be added. Following are the things that can be done with few modifications.

1) Keypad and LCD could be replaced by touch screens which can make human work easier by drag and drop method.
2) GPS Interfaces.
3) USB Music media playback interface.

IX. CONCLUSION

Transferring the data through USB in today's scenario is the most common task. But for transferring the data to a personal computer or laptop is difficult if one does not have any of them. It is affordable to purchase a USB data drive than purchasing a laptop or PC. Therefore this battery operated affordable device can transfer the data between two USB data drives and with Bluetooth device without the help of PC or laptop. The advantage of this device is that it is battery operated so there is no need of power supply connection and data transfer can take place at any place.

REFERENCES

[1]. Ducloux J and Petrashin P. An Embedded USB dual role System Integrated for mobile devices. IEEE, 2012.
[2]. AXELSON J. USB Complete. Penram Publications, 2nd edition, 1999: 1-5.
[3]. AXELSON J. USB mass storage, Lakeview Publications, @2nd edition, chap. 4, pp 57-69. 2000.
[4]. Subhash S and Shinde AA. Data Transfer Between Two USB Disk Without Use of Computer. International Journal of Emerging Technology and Advanced Engineering, 2013; 3:595-598.
[5]. USB Implementers Forum Inc., www.usb.org/ interoductionusb-2.0papers
[6]. Gawali VS and Agarkar AM. Pen Drive to Pen Drive and Mobile Data Transfer Using ARM. IOSR Journal of Electronics and Communication Engineering, : 43-47
[7]. Atmel AVR Atmega32 data sheet.
[8]. FTDI Vnc1l datasheet.
[9]. ieeexplore.ieee.org.
[10]. www.avrfreaks.com
[11]. www.engineersgarrage.com
[12]. www.ftdichip.com
[13]. Xiaoyan Z and Yong T. Design and Realization of an embedded storage system based on LPC2387 microprocessor. IEEE, 2010.

