Device to Device Direct Data Relay

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Abstract: Under normal circumstances, if we want to copy or move data from one mass storage device to another, we use the computer as an intermediate device. When copying data is your only requirement, it is overkill to use a full-fledged computer to do something so ordinary as to transfer data. However to operate these devices, most of the times we use an operating system which is susceptible to attacks and security breach. The disadvantage of using USB Flash Drives is that it requires a PC to initiate file transfers between one another and it does not have any wireless facility. As a solution to the above problem, our project aims to develop a device that allows the file transfers between two USB devices without use of personal computer.

Keywords: file transfer, mass storage, operating system, PC, USB devices.

I. INTRODUCTION

In the present world of electronics there are various ways are present for storage of any type of data electronically, today’s most used and flexible is pen drives, but data transfer between them is related with computers, and we are unable to share files between two USB flash drives when user is away from computer. This project is complete blend of hardware and software which is developed on the lines which will directly transfer the data between USB flash drive to USB flash drive without connecting to computer.This innovative idea allows us to develop a device that is capable of transferring data directly between two pendrives which are placed at different locations. That is we transfer data between two pendrives through GPRS connection without help of a computer.USB to USB Data Transfer Device is a gadget that can be used to do “data communication” (i.e. data transfer) between two USB mass storage devices. This means we can also transfer data between digital camera, phone mass memory and other similar devices. The popularity of Universal Serial Bus (USB) storage devices is an indication of the computer user's need for a fast, large capacity and easily accessible system for data storage. As the development of USB enabled peripherals increases, the Universal Serial Bus (USB) has rapidly become a de facto standard in communication with the Personal Computer (PC) and has led to new technologies for interfacing memory devices. These memory/storage devices connect to the USB ports and appear as removable storage device inpersonal computers, the most popular of which is the USB Flash Drive (pen drives).

More- over, transferring data via a computer involves a lot of power to be wasted, since the computer has to be entirely functional before it can transfer data. Also, the threat of viruses and malware has made the security of computer users more complicated. These viruses get activated as soon as the device is plugged into the system and get copied along with other data from one device into another. Our project here can provide a valuable solution to all problems faced by person in above situations. Our aim is to build a small and handy device to transfer data from one USB Flash device to another. The device will have following features:-

1. Small and lightweight device
2. Powered by 9V battery
3. Support for all USB Flash devices formatted with FAT32 file System
4. Support for USB 2.0
5.Portable.

1.1. Universal Serial Bus (USB)

USB was initially designed to be an interface for communicating with many types of peripherals without the Limits and frustrations of older interfaces. Every recent PC includes USB ports that can connect to standard peripherals such as keyboards, mice, scanners, cameras, printers, and storage drives. It is a very useful protocol designed for a computer to communicate with almost any type of peripheral. Some of its benefits for users include:

1. Single Interface for many devices.
2. Considerably high Data rate.
3. Automatic Configuration.

4. Easy connection.
5. Hot Pluggable.
6. No user Settings.
7. Frees Hardware Resources for other devices.
8. No extra Power Supply needed.
9. Low Cost and Low Power consumption.

1.2 Benefits for Developer include

1. Operating system support.
2. Peripheral support.
3. Open source support available online.
5. Versatility.

1.3 Inside USB

As mentioned above, the connection comprises of four terminals.

1. vcc
2. D-
3. D+
4. Ground

II. IMPLEMENTATION

The block diagram helps the user understand the working of the device better. The device constitutes of
an ARM Cortex, USB Host, pendrive, LCD and Keypad and a GSM module.

2.1)ARM (LPC 2138)

It is the heart of the system. It is important unit of the system because it reads data which are programmed and stored onto its ROM, then it executes it and controls the Display as well as Vinculum VNC1L Embedded USB Host controller.

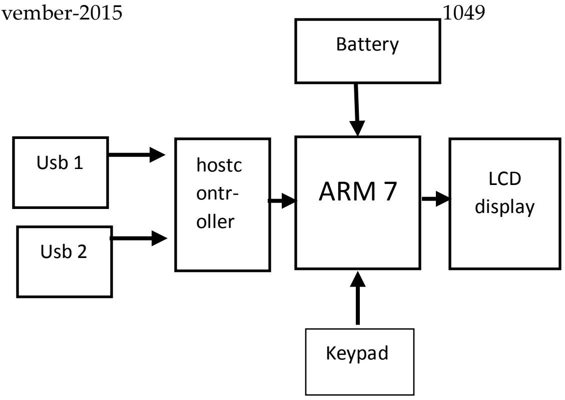


Fig1. Block diagram of Usb data logger

When key is pressed it reads the data from source pen drive and writes onto destination pen drive. Frequently, a C program must interact with the outside world using input and output devices that communicate directly with a human being. One of the most common devices attached to an ARM7 is an LCD display. Some of the most common LCDs connected to the ARM7 are 16x2 and 20x4 displays. This means 16 characters per line by 2 lines and 20 characters per line by 4 lines, respectively. It displays events taken into microcontroller step by step alphanumerically. So it is convenient for us to know what is currently running in the system. It displays the start and finish of the data transfer. Host Controller (VNC1L) recognizes the input peripheral as host or slave according to firmware loaded in it. The sub module physically interfaces with the USB flash drives and is responsible for converting raw data and information to their proper NRZI encoding as specified by the USB technical specifications. Further-more, the sub module is capable of encoding or decoding the incoming NRZI data from the USB flash drives and forwards it to their respective sub modules for further processing. It handles all types of transfer between source and destination. We have incorporated the USB Host controller which has two independent USB 2.0 low speed/high speed USB Host ports. Individual ports can be configured as host or slave.

USB Host Controller IC– VNC1L To begin with, selection of the USB host controller IC is to be done. Host controllers can be found in market, in two types viz. Dedicated IC for USB Host, Slave and device operations, and USB Host controllers included in microcontrollers. The second most important criteria to look for is the presence of two USB ports on the Host Controller to avoid the use of buffer and extra hardware. One more feature to look for was support for FAT-32 file system included hardwired on the Host controller to avoid complications in microcontroller code to decode it. A dedicated USB Host Controller from Vinculum was found- VNC1L. It has got following features over host controllers included on chip of General Purpose Microcontrollers:

□ Two independent USB 2.0 Low speed / Full speed USB Host / Slave ports

□ Entire USB protocol handled on the chip
□ 8/32bit MCU core
□ Twin DMA controllers for hardware acceleration
□ 64kB embedded Flash ROM Prog. Memory, 4kB Data SRAM
□ Interface to MCU / PLD / FPGA via UART/ FIFO/SPI interface
□ Upto 28 GPIO interface pins for data I/O and command monitor interface
□ 3.3V operation with 5V safe inputs
Selection criteria for VNCIL
□ Twin Host Controllers inbuilt
□ Availability of Twin DMA controllers
□ Availability of ready VDAP
□ NCU- 32bit Numeric Co-processor Unit for handling of FAT32 file system
□ Handles entire USB protocol On Chip.

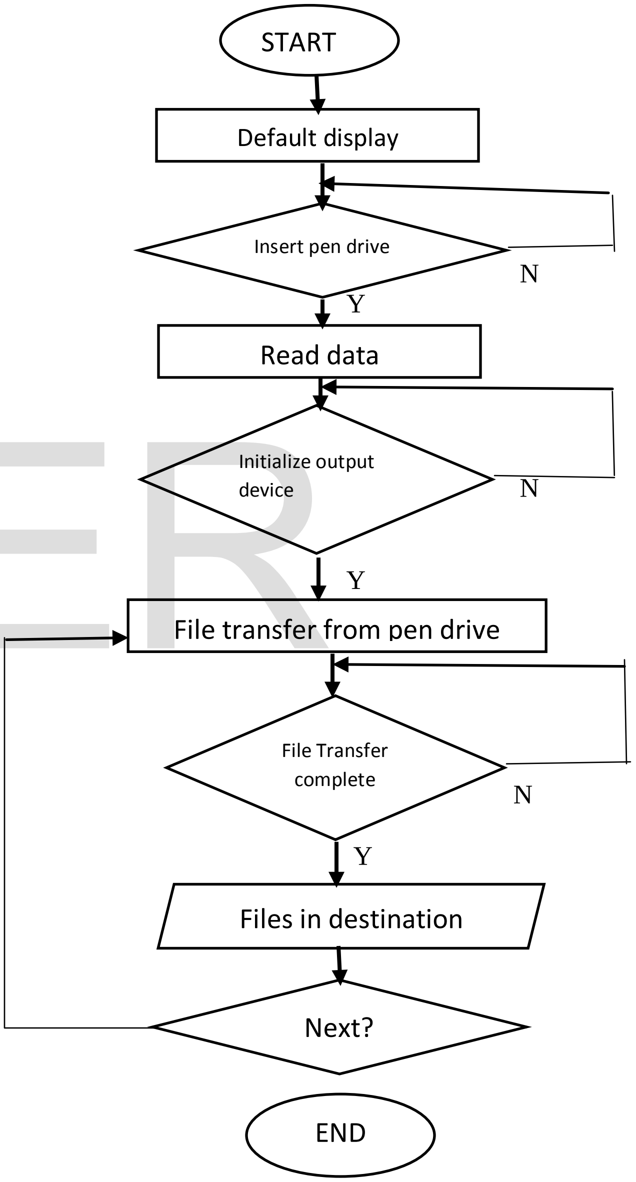
2.2)USB Flash Disk:

These are source and target Devices. They will be connected to the USB Host Controller IC via the USB interface. Both the devices can be accessed simultaneously. The memory on them is in the form of Flash which is accessed by an on board hardware. These devices have also got protocol handling hardware included on device. FAT-8, FAT-16, FAT-32, NTFS, are some file systems available in Microsoft Operating Systems. Majority of USB Flash devices are formatted in FAT-32 file system. There may sometimes be Partitions on the drive. Data encrypted with all above formats can be accessed with an efficient Firmware on the USB Host Controller.

USB Host Controller IC: This is a microcontroller which has an interface to connect a USB device. It has a Central Processing Unit of its own. The requirement here is of 2 USB ports. It is the main device that handles the USB protocol and does the jobs of the USB host. It will be responsible for creation of endpoints, establishment of pipes, initiating transfers, enumeration etc. We can preferably look for capability like DMA so that CPU remains free while Data transfer.

III. EXPERIMENTATION

System flow chart



IV RESULT ANALYSIS

A wireless device-to-device data communication system has been implemented. We have eliminated the use of computers and operating system for communicating between two remote devices. This prevents the threats and makes it a secure system. The data transfer is achieved by GSM/GPRS which provides a world wide access to wireless communication and the distance constraints are ruled out.

V CONCLUSIONS

Transferring the data through USB in today's scenario is the most common task. But the problem is that for transferring the data to a personal computer or laptop is difficult if u don't have any of them. It is affordable to purchase a USB data drive than purchasing a laptop or PC. Therefore we came up with a handled battery operated affordable device which can transfer the data between two USB data drives 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. Currently we have designed the system for transfer of data up to 2GB only, but it can be increased by proper selection of the bus.

VI SCOPE FOR FUTURE WORK

While working on the development of the system and exploring the peripherals that can be interfaced with the ARM 7 we found that with little modification in the project several new features could be added. Following are the things that can be done with few modifications.

1. Add USB host capability to embedded products.
2. Interface USB Flash drive to MCU/PLD/FPGA.
3. Using Bluetooth in our device, we can connect with any Bluetooth enable devices making the data transfer wireless.
4. Keypad and Graphical LCD could be replaced by touch screens which could make human work easier by drag and drop method.

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