TITLE: STANDALONE USB TRANSFER DEVICE

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ABSTRACT

Recent days, there is huge requirement of fast data transfer in all sectors. There are many such kinds of static devices like Pen Drives, USB portable Disks etc are used in daily applications to transport or store a data. We need to transfer these data from one device to another and for those operations we require PCs, Laptops. Even though for a small data transfer of Pen Drives we must require heavy systems like PCs, Laptops and those are expensive and bulky. There is imminent need of Device which can overcome this problems, hence we are designing such a device called "Standalone USB Transfer Device" by using PIC Microcontroller[1]. In this project we can see the data from both Pen Drives on LCD and we can select desired files to copy or move between them. There is a Keypad also used to scroll and selection of menus of operations in this project. The aim of the proposed system is to remove every time need of the computer for the data transfer. To do so, the system uses an independent solution for the problem – Standalone USB Transfer Device. The concept of this device will make it possible to carry out the mass data transfer anywhere, anytime. This project is built around the PIC Microcontroller to accommodate all the requirements that the end users may want. The portability and small foot print are the major advantages of this Device. It is an embedded solution to a practical problem. The design of device also require USB host Controller named VINCULUM 2.0 [2] which employed for actual USB Data transfer. This module operates on the instructions given by PIC Microcontroller. The Standalone refers for independence of operation. There is no need of Operating system to run this device. This device is battery operated hence power interruption problems are eliminated.

Keyword: - *PIC Microcontroller [1],VINCULUM 2.0 [2]*

1. Introduction

In general Pen Drive to Pen Drive Data Transfer application there is need of PC or Laptop. It is very time consuming process because there is more time required for startup and initialization of those machines. The expenses for this small data transfer operation is high. Also PCs and Laptops are bulky devices to carry somewhere another places. The operating system of PCs and Laptops can be threatened by Viruses, Malwares etc from Pen Drive Data. As compared to this there is no major threats happened to Standalone USB Transfer Device because of machine level language. This is important advantage of Project. This device facilitates user to Copy or Move particular file from Source Drive to Destination Drive. The complexity of Operations of device is well organized by using Menu formats which are displayed on LCD. The selection of operations on both Drives can be done by using Keypad. One can navigate directory of file names by keys. Operations on USB Drives are handled by USB Host Controller Device. The VINCULUM version 2.0 is used for USB Copy, Move Operations. Both USB Drives are connected to VINCULUM module. The PIC Controller communicate with VINCULUM module by USART Serial Communication. Instructions given by PIC Micro Controller are processed on VINCULUM module this causes actual File or Data Transfer Task.

1.1 Objectives

Accomplishment of design objectives are given below

- Less Time Consumption for Data Transfer between two Pen Drives.
- User friendly Design
- Less power Consumable Design
- Simpler User Interface
- Highly Portable Design
- Plug and Go functioning
- To develop a Design as Market Product

1.2 Features

Prominent features of Design are

- Small Light Weight Handy Device
- Powered by 5V battery supply
- Supports all USB Drives with FAT 32 Format
- High Data Transfer Rate
- Portable Device

2. Design Requirements

We are using PIC 18F4520 Microcontroller to achieve the Data transfer between two Pen Drives. The PIC Microcontroller includes USART Serial Communication feature which is used to setup communication between Microcontroller and USB Host Controller Device. Instructions of tasks are given to USB module and operations are done by USB Host Controller Device. There is LCD and Keypad also used to provide user selections of operations. All those hardware components are interfaced to PIC 18F4520 Microcontroller.

Hardware Components are listed below

2.1 PIC 18F4520

PIC Microcontroller is important design aspect in the device, Whole tasks are carried by PIC Microcontroller.
The communication of peripherals like USB HOST Controller VINCULUM Module is done by USART Serial Communication. PIC18F4520 have internal Oscillator of 40MHz frequency. This PIC family Microcontroller runs on 5V Power Supply and having most important features for USB Applications.
The features of PIC 18F4520 are given in Table -1.

Table -1: PIC18F4520 Features

RAM	**32K**
EEPROM	**256 bytes**
SRAM	**1536bytes**
Internal Oscillator Frequency	**40MHz**
USB Support	**2.0**
EUSART	**1**
Timers 8/16 bit	**1/3**
I/O	**36**

2.2 VINCULUM (USB Host Controller)

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 FA T-32 file system included hardware 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 useful features over host controllers included on chip of General Purpose Microcontrollers. It is shown in fig-1.

Fig -1: VNC1L VDIP-2

Features:
- Dual USB ports
- Support UART, SPI, Parallel FIFO interfaces
- Single 5V Power Supply

2.3 LCD 16x4

To provide Menu distribution of design operation to User LCD is used for Display purpose. In this design we are using 16x4 LCD to display the Menu Script and running status of system.

2.4 Keypad

User is allowed to select the particular Data to be transferred from one Drive to other. Also User can decide the type of operation on data like copy or move, hence to achieve these objective our design includes support of keys which are interfaced with PIC18F4520 Microcontroller.
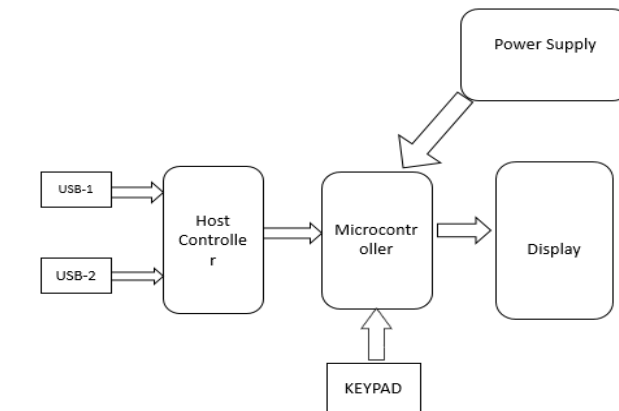
3. Implementation

Fig -2: Block Diagram

According to block Dig. Of Standalone USB Transfer Device shown in Fig-2 Microcontroller is main hardware component which provides interface for other peripherals. MPLAB-X IDE Tools are used to Program PIC 18F4520. Display, Keypad and VINCULUM USB Module are interfaced to PIC controller. USB host controller provides USB connections to Drives. VINCULUM 2.0 is used as USB Host Controller Device in this Project. VNC1L Device is VINCULUM family Microchip Board having two USB ports. The Task of VNC1L is to read and write USB drive. VNC1L module includes firmware which is provided by Manufacturer. PIC Microcontroller sends instructions for read and write operations of USB to VNC1L module. This communication is achieved by using UART.

UART Interface

When the data and control buses are configured in UART mode, the interface implements a standard asynchronous serial UART port with flow control. The UART can support baud rates from 300baud to 3Mbaud. Following general Commands are used in VNC1L operations.

Table -2: VNC1L USB Commands

Command	Operation
A:\>	Select Source Disk
B:\>	Select Destination Disk
DIR	Read Current Disk Directory
CPF	Copy file
MPF	Move file

4. FUTURE SCOPE

There will be numerous improvement for the design of Standalone USB Transfer device is present in future.
- Interface of peripherals by using MCU/FPGA/PLDs for expanded applications
- Bluetooth Module can be used to make wireless Transfer of Data
- Keypad & GLCD can be replaced to Touch Screen to make easier User handling like Drag and Drop Method.

5. CONCLUSIONS

Implementation of Standalone USB Transfer Device is most generic product especially designed for Data Transfer using PIC Microcontroller. The Device features and cost overcome the recent problems in Data Transfer Applications. It saves time accordingly cost, the effectiveness of portability and handiness of device is plus point for this Product. The power consumption issues are also eliminated. The complexity of programming is reduced due to ease of PIC Microcontroller Programming. There is no OS needed for operation of the Device.

6. REFERENCES

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