

A CONCEPT OF DATA TRANSFER VIA BLUETOOTH IN PEN DRIVE

K.B.Tripathy, Ankita Sharma, Prince Goyal, Avnish Sharma, Mr. V. Upmanu
SDCET Sunder Deep College of Engg. & Tech., Ghaziabad

Abstract: With diversification of systems and their operating environment, sometimes it becomes impossible at the 11th hour to transfer data from one system to another. Due to this limitation often need is felt of transferring data wireless between the two systems not having proper channel for communications. This can be done by implanting or embedding a small BLUETOOTH micro-chip on the pen drive. This invention would prove fruitful if Bluetooth devices would work on the firmware already present on the chip rather than having the need to connect & identify devices through the software on an operating platform. However, there would be speed limitations but the technique can at least save us from not having to transfer data at all between the two systems. The bandwidth at which the two devices are operating can be increased substantially by choosing the right on-board chip of high quality but still should be cost effective. A future extension of the technique can be implemented over Wi-Fi through a miniature modem as an embedded chip in the storage device itself. Hence a great limitation to communication between devices not operating in the same environment or system can be worked out through this experimental work. So, by this device we can easily transfer our data directly from pen drive to pen drive or from mobile phone to pen drive without the use of PC or Laptop.

INTRODUCTION

Already thriving within the telecommunications market, wireless technology is preparing to embrace computing on an even larger scale. Presently, most people encounter wireless local area networks (WLANs) in airport lounges and tech-savvy offices. Everywhere around the world, this new generation prefers the wireless technology for their work and also the technologies are growing by leaps and bound to carry out all the desires of the customers to fulfil their demands. Several data and application 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.

Different types of USB ash devices are used now-a-days. It is not necessary that all of these devices are supported by the computer and the operating system and their device drivers are available and installed. 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. 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 life 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 ash 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 or to mobile phones. The device will have following features:

- a. Flash Drive USB 2.0 with Bluetooth chip
- b. Powered by 9V battery
- c. Hardware to install Bluetooth drivers
- d. Turn on/off switch for Bluetooth
- e. Plug and Go Function

General Idea of the Project:

The idea includes a flash drive of 1GB capable of transmitting and receiving data wirelessly between itself and other devices. Infrared, Bluetooth and satellite communication can be used for this objective. But due to very less range of operation of infrared and expensive satellite communication, we have decided to use Bluetooth for this wireless data transmission. Bluetooth, named after a king of Denmark, Herald Bluetooth, works on ISM Band of 2.4GHz to 2.48GHz.

Bluetooth

Bluetooth is a wireless technology standard for exchanging data over short distances (using short-wavelength radio transmissions in the ISM band from 2400–2480 MHz) from fixed and mobile devices, creating personal area networks (PANs) with high levels of security[7].

Implementation:

Bluetooth uses:

A radio technology called frequency-hopping spread spectrum, which chops up the data being sent and transmits chunks of it on up to 79 bands (1 MHz each; centered from 2402 to 2480 MHz) in the range 2,400–2,483.5 MHz (allowing for guard bands). This range is

in the globally unlicensed Industrial, Scientific and Medical (ISM) 2.4 GHz short-range radio frequency band. It usually performs 800 hops per second, with Adaptive Frequency-Hopping (AFH) enabled.

Bluetooth is a packet-based protocol with a master-slave structure. One master may communicate with up to 7 slaves. In a piconet; all devices share the master's clock. Packet exchange is based on the basic clock, defined by the master, which ticks at 312.5 μ s intervals. Two clock ticks make up a slot of 625 μ s; two slots make up a slot pair of 1250 μ s. In the simple case of single-slot packets the master transmits in even slots and receives in odd slots; the slave, conversely, receives in even slots and transmits in odd slots. Packets may be 1, 3 or 5 slots long but in all cases, the master transmit will begin in even slots and the slave transmit in odd slots[12].

Bluetooth provides a secure way to connect and exchange information between devices such as faxes, mobile phones, telephones, laptops, personal computers, printers, Global Positioning System (GPS) receivers, digital cameras, and video game console. It was principally designed as a low- bandwidth technology.

Uses: Bluetooth is a standard wire-replacement communications protocol primarily designed for low power consumption, with a short range (power-class-dependent, but effective ranges vary in practice; see table below) based on low-cost transceiver microchips in each device. Because the devices use a radio (broadcast) communications system, they do not have to be in visual line of sight of each other, however a quasi optical wireless path must be viable

Class

mW

dBm

Range(m)

Class 1

100

20

100

Class 2

2.5

4

10

Class 3

1

0

1

Use In The Project: Bluetooth is used in our project as a communicating device with the other Bluetooth enabled device to build a path defined by ISM band and connect it to transfer the data in the pen drive.

Here the Bluetooth of any system laptop or cell phone will find the the Bluetooth zone of that attached with the flash drive and auto connects with it as it was already programmed due to the lack of lcd in the Bluetooth enabled pen drive device. After the setup of the connection controller soon will allow the sharing of data between the path and the till the time of buffering it will use the very small amount of memory chip and after that controller will transfer the data to the main chip. For the purpose of read and write operation, we need a battery to give the electric charge to the transistors of the flash drive or to active the controller to work properly for the required operation and data transfer.

Pen Drive:

Trek Technology and IBM began selling the first USB flash drives commercially in 2000. Trek Technology sold a model under the brand name "ThumbDrive", and IBM marketed the first such drives in North America with its product named the "DiskOnKey," which was developed and manufactured by M-Systems.

Modern flash drives have USB 2.0 connectivity. However, they do not currently use the full 480 Mbit/s (60 MB/s) which the USB 2.0 Hi-Speed specification supports because of technical limitations inherent in NAND flash. The fastest drives currently available use a dual channel controller, although they still fall considerably short of the transfer rate possible from a current generation hard disk, or the maximum high speed USB throughput[6].

File transfer speeds vary considerably and should be checked before purchase. Speeds may be given in Megabyte per second, Mbit per second or optical drive multipliers such as "180X" (180 times 150 KiB per second). Typical fast drives claim to read at up to 30 megabytes/s (MB/s) and write at about half that speed. This is about 20 times faster than USB 1.1 "full speed" devices, which are limited to a maximum speed of 12 Mbit/s (1.5 MB/s)[14].

Essential Components: There are typically four parts to a flash drive:

a. Standard-A USB plug– provides a physical interface to the host computer.

b. USB mass storage controller– a small microcontroller with a small amount of on-chip ROM and RAM.

c. NAND flash memory chip(s) – stores data (NAND flash is typically also used in digital cameras).

d. Crystal oscillator– produces the device's main 12 MHz clock signal and controls the device's data output

through a phase-locked loop[18].

Figure: 1

a. USB Standard, Male A-Plug.

b. USB mass storage controller device/

c. Test Point.

d. Flash Memory Chip.

e. Crystal Oscillator.

f. LED (Optional).

g. Write-Protect switch (Optional)

h. Space for second Flash Memory Chip.

Requirement in Our Project: As the name of this project suggests, Bluetooth enabled pen drive, flash drive is required for the memory storage of data as this chip stores the data which will be send to it through the Bluetooth. Flash drive or so called pen drive is given a name flash drive because of its non-volatility nature and writing and reading can only be done by the use of electric charge. When there is no electricity provided to it, no process of reading or writing data will occur hence it is known as the storage device because once anything was written on the memory chip constituting of transistors and flip-flops saves the contents kbt.jpg after the electricity is removed till again is applied and given some instructions.

LITERATURE REVIEW

A core team of UMAX Technologies from U.S.A. is doing their research on this project and apart from that there is nothing in the market or in the research up to best of my knowledge. They have their work limited to pen drive of only 256MB maximum. The device will work over the Bluetooth link as well as with the USB 2.0 interface also. This project will completely different from a normal pen drive due to many reasons.

Idea Innovation: The idea of this project was taken, looking at the problems faced in daily life of Flash Drive Users to transfer the data from one disk to another. 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 as small and handy as

possible. Moreover, transferring data via a computer involves a lot of power to be wasted. There are numerous types of data transactions that are being carried out through these devices. However to operate these devices most of the times an operating system is required which calls for the hosts to be extremely complicated system hence accessing these devices requires complicated hardware, hence a controller that can handle the data transfer and initiates the USB transactions was searched.

IMPLEMENTATION DETAILS

There are three ways of designing this project with only the difference of the task becoming much hard and less costly to less hard and more costly. This three methods includes

a. Using PIC24FJ64GB002

b. Using Microcontroller with Embedded Linux

c. Using Operating System

Among these three, we prefer project design using operating system.

Figure: 2

Proposed Block Diagram:

a. Flash Drive with USB interface: It is the pen drive for keeping the data stored in it. They are also called as flash drive.

b. Operating System: It is used so that the drivers of Bluetooth and file manager can be installed easily in it using the operating system.

c. Bluetooth Hardware: It is the Bluetooth chip or device used to create a link between two or more operating devices. Here WT12 Bluetooth chip will be used manufactured by BLUEGIGA Pvt Ltd.

d. Communication Link: It is the link through which data will travel from other Bluetooth enabled devices to the pen drive or vice versa.

e. Battery: It is used to provide the power to Bluetooth chip and memory drive so that it can perform read/write operation.

f. Driver: It is required to allow the use of Bluetooth over the processor used and also for some data handling process.

METHODOLOGY

As discussed earlier, there are three methods for making this project. They are explained below with their benefits and losses.

Using PIC24FJ64GB002: PIC is the family of modified Harvard architecture microcontrollers made by Microchip Technology, derived from the

PIC1650 originally developed by General Instrument's Microelectronics Division. The name PIC initially referred to "Peripheral Interface Controller". They are of 8 bits as well as 16 bits available in the market. The above written PIC series is the name of the arrangement of a microcontroller with an OTG support i.e. USB 2.0 and a Bluetooth chip WT12 can also be connected to that microcontroller easily[19].

Figure: 3 Microcontroller with PIC processor

While using this method our requirements are

- a. PIC based Microcontroller
- b. Flash Drive with USB 2.0 support
- c. Bluetooth chip WT12
- d. Power Supply (to microcontroller)
- e. Driver for Data Handling

Using this will give a lot of benefit in saving the time of designing the project because with this methodology, all we need is a driver for data handling which might be considered as a big issue after purchasing the microcontroller because rest of the equipments can be found easily. But lightening towards the losses of this methodology, it says:

- a. It is not easy to get this microcontroller with OTG in India as they are not used so much in any of the projects or business going on in our country.
- b. We have to purchase it from outside but we don't have the right to purchase them directly from outside market, a vendor is required who can purchase them for us.
- c. But then the other problem is if that vendor can get one or two pieces or not because generally they purchase them in bulk whenever the products are required.
- d. It will increase the cost of the project with no extra benefit and delivery of the product will also take 45- 50 days to reach.
- e. Writing a driver on PIC processor also need a little deep knowledge of its coding. These are the few drawbacks of this methodology which asks us to pull our hands from it.

Using Microcontroller: In this method, we are actually doing all the things very separately from others by making all the required models by our own. In this methodology, we are using Embedded Linux as an operating system source and the board of embedded Linux for our practical purpose and connect the USB 2.0 port in the board so as to fulfill our requirement. It does not have any dependency on others and all the required products are easily available in the market. But it also has some drawbacks discussed below,

- a. It is a process of 1 to 2 years to complete the project by getting the knowledge about embedded Linux.
- b. Embedded Linux will work as an operating system in which we have to define the work of every blocks or equipment by writing their drivers which is not so easy task.
- c. To make the receiving device understood the sent data, it is also compulsory to write the algorithm for every file type or limiting it to a single or two formats.
- d. Cost of embedded Linux is 7000 INR with its board.

Using Operating System: Now the third methodology and which is more preferable one as per our research till now. In this methodology we are using an operating system but the question is how? Everyone had kept their O.S. as a proprietary property. But thanks to Google who has created android for the day like present days. We can use android because it is an open source in the market and is easy to learn. By installing an O.S. in our device we don't have to do lots of driver's coding for asking the platform to perform because it is already explained in that O.S. Now the only driver we have to install is that of file manager to manage the transmitted data towards the place where we want to save that data. Now, one will ask how you will install android and where? The answer is that we are using the same board as in the 2nd methodology and then we will install android over the Embedded Linux so as to make our effort for reading about Embedded Linux coding reduced. Here we have to work on the android platform and is also easy to learn and implement.

Why only this idea of making project using o.s. Is chosen??

The main burden of using the other two is writing the drivers for that. It is no an easy task to write drivers within a short period of time. Few of the benefits of using this methodology are

- a. We don't require any extra time to complete it. It is the earliest we can do for this project. But the research will continue with the same pace so as to design a particular O.S. for the device we are making.

b. Task of writing the drivers will be reduced, hence it increases the speed of making the project. c. Android is an open source platform so if there is any need rises afterwards in changing the coding and all, will be very easy.

d. Android is coded as per the protocols and standards defined by ITU relaxing us in this also.

WORKING PROCESS OF PROPOSED DEVICE

System Flow Chart:

Figure: 4

kbt.jpg

Hardware Prototype:

Figure: 5 (a) Internal Structure of pen drive

Figure: 5 (b) Pic Microcontroller

RESULT ANALYSIS

Problems are stepping stones towards success. Once we start working with the hardware we are bound to face some obstacles in our way to reach our goal. While working on the hardware of the project we initially had opted for an ARM board combined with the general purpose board. The idea was opted because we were new with the use of the PIC Microcontroller and so the method we opted was the try and error method. Also it was used so that future modifications could be made easier if required or necessary. We initially mounted all the circuit components related to the ARM board and so far the work was going as we had planned. The problem arised as we mounted the Bluetooth chip, the board became bulky and it became difficult for us to mount all the components that were to be interfaced between ARM and Bluetooth link

CONCLUSION

Transferring the data through USB in today's scenario is the most common task. But the problem is that for transferring the data from a personal computer or laptop to mobiles or other pen drives is difficult if you don't have any of them. It is affordable to purchase a USB Bluetooth Enabled pen 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 Bluetooth enabled devices without the help of PC or laptop.

FUTURE ASPECTS

a. Reverse of the same is possible that is transferring of data from pen drive to cell phones and systems.

b. Display screen can also be inbuilt in the pen drive.

c. We can handle the data of pen drive by making folders or deleting them using the display and scroll keys.

d. Theoretical concept has been developed in the paper for which practical implementation can be done.

e. It can also be further implemented in Wi-Fi technology with the help of Bluetooth in a particular region.

REFERENCES

[1] Parmar, C.D.; Dwivedi, V.V.; Wandra, H. H., "Firmware for file transfer between Bluetooth module and flash memory through microcontroller in an emerging concept of wireless portable memory access," Communication Control and Computing Technologies (ICCCCT), 2010 IEEE International Conference on , vol., no., pp.42,46, 7-9 Oct.2010 doi: 10.1109/ICCCCT.2010.5670781

[2] International Journal of Engineering Research and Development, ISSN: 2278-067X, Volume 1, Issue 6 (June 2012), PP.25-34.

[3] Arfwedson, Henrik and Sneddon, Rob, "Ericsson's Bluetooth Modules", Nov 4,1999. Ericsson Review No.4,

PP 198-205

[4] Robert L. Boylstad, "Electronic Devices and Circuit Theory", Edition Eight. [5] Behrouz A Forouzan, "Data Communication And Networks", 4th edition.

[6] http://en.wikipedia.org/wiki/USB_flash_drive

[7] <http://en.wikipedia.org/wiki/Bluetooth>

[8] <http://www.bluetooth.org/>

[9] <http://compnetworking.about.com>

[10] <https://play.google.com/store/apps/details?id=it.medieval.bluetooth&hl=en>

[11] http://www.freebsd.org/doc/en_US.ISO88591/books/handbook/network-bluetooth.html

[12] <http://www.gsmarena.com/glossary.php3?term=bluetooth>

[13] [http://www.indiastudychannel.com/experts/21785-internal-](http://www.indiastudychannel.com/experts/21785-internal-structure-pen-drive.aspx)

[structure-pen-drive.aspx](http://www.indiastudychannel.com/experts/21785-internal-structure-pen-drive.aspx)

[14] http://en.wikipedia.org/wiki/USB_flash_drive

[15]

<http://www.datasheetarchive.com/pen%20drive%20circuit%20diagram-datasheet.html>

[16]

<http://in.answers.yahoo.com/question/index?qid=20090619072920AAXmB45>

[17]

http://www.fileguru.com/apps/pen_drive_circuit_diagram

[18] <http://www.durofy.com/technology/inside-the-usb-pen-drive/>

[19]

<http://www.microchip.com/wwwproducts/Devices.aspx?dDocName=en536121>

[20]

<http://www.google.co.in/url?sa=t&rct=j&q=Arfwedson%2C+Henrik+and+Sneddon%2C+Rob%2C+>

[%E2%80%9CEricsson%E2%80%99s+Bluetooth+Mod-&source=web&cd=2&cad=rja&ved=0CDYQFjAB&url=ht](http://www.google.co.in/url?sa=t&rct=j&q=Arfwedson%2C+Henrik+and+Sneddon%2C+Rob%2C+%E2%80%9CEricsson%E2%80%99s+Bluetooth+Mod-&source=web&cd=2&cad=rja&ved=0CDYQFjAB&url=ht)

[tp%3A%2F%2Fwww.google.com%2Fpatents%2F%3Fvid%3DUSPAT7801561%26output%3Dpdf&ei=ZCFuUbnDOPHPPrQeB4IDoCQ&usg=AFQjCNEmFr-4mWoiZQ780CVrv8rkdooyQ&bvm=bv.45368065,d.bmk](http://www.google.com/patents%2F%3Fvid%3DUSPAT7801561%26output%3Dpdf&ei=ZCFuUbnDOPHPPrQeB4IDoCQ&usg=AFQjCNEmFr-4mWoiZQ780CVrv8rkdooyQ&bvm=bv.45368065,d.bmk)

[21] <http://www.developer.android.com>