3. Hardware Design of Optical USB

A. **Serial Communication**: In general, there are three communication methods used in modern data acquisition systems between computer and peripherals: traditional RS232 serial port, parallel port, and universal high-speed data acquisition card. But not all these methods are ideal. Here are some examples, the transmission speed of RS232 serial port is too low to meet the requirements of real-time, the connection of parallel port is complicated,and high-speed data acquisition card based on ISA or PCI is complex and expensive. As a standard universal serial interface, the best advantages of USB interface is its high speed, feasibility, support for Plug and Play, and automatic. The USB (Universal Serial Bus) is a fast and flexible interface which can be used to connect electrical devicesto a PC, and, as such, has become one of the most popular device interfaces .[3] Its merits are its ease of connection, fast data rate and the fact that most personal computers support it.[3].A serial communications interface (SCI) is a device that enables the serial (one bit at a time) exchange of data between a microprocessor and peripherals such as printers, external drives, scanners, or mic. Serial communication is a communication technique used in telecommunications wherein data transfer occurs by transmitting data one bit at a time in a sequential order over a computer bus or a communication channel. It is the simplest form of communication between a sender and a receiver. Because of the synchronization difficulties involved in parallel communication, along with cable cost, serial communication is considered best for long-distance communication. The SCI contains a parallel-to-serial converter that serves as a data transmitter, and a serial-to-parallel converter that serves as a data receiver.

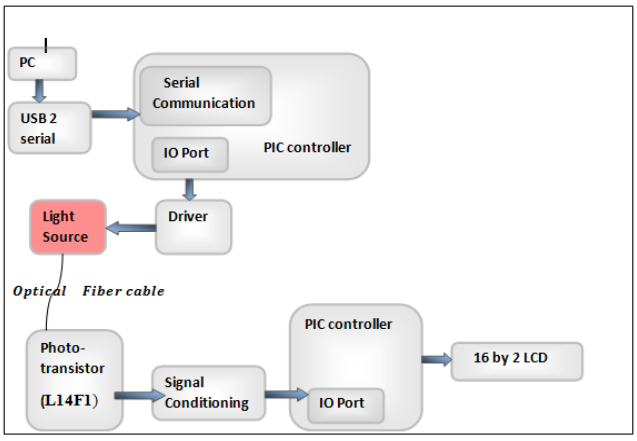

Figure 2: Block Diagram of Optical USB Communication

1. PIC16F877 Microcontroller:
8-bit microcontrollers with 40-pins flash microcontrollers that operate in a range 2.0 to 5.5 V at 20 MHz with internal oscillator. It has high performance RISC CPU, interrupt capability, direct, indirect and relative addressing modes, 8K flash Program Memory,368 bytes of data Memory (RAM), 256 EEPROM data Memory, Programmable code protection, power saving sleep mode, 8-bit analog to digital converters (ADC), serial peripheral interface modules, USRT, 3 timers & 5 ports.The microcontroller is well suited for this remote application, because of its low-power consumption, high speed, power on reset facility, in circuit programming & debugging.

2. RS-232 Specifications
RS 232 is a serial communication cable used in the system. Here, the RS 232 provides the serial communication between the microcontroller and the outside world such as display, PC or Mobile etc. So it is a media used to communicate between microcontroller and the PC.RS–232 is a "complete" standard. This means that the standard sets out to ensure compatibility between the host and peripheral systems by specifying 1) common voltage and signal levels, 2)common pin wiring configurations, and 3) a minimal amount of control information between the host and peripheral systems. Unlike many standards which simply specify the electrical characteristics of a given interface, RS–232 specifies electrical, functional, and mechanical characteristics in order to meet the above three criteria. In our project the RS232 serves the function to transfer the edited notice (or data) from PC (VB software) to the microcontroller, for the further operation of the system.

3. MAX232
MAX232 is compatible with RS-232 standard, and consists of dual transceiver. Each receiver converts TIA/EIA-232-E levels into 5V TTL/CMOS levels. Each driver converts TTL/ COMS levels into TIA/EIA-232-E levels. The MAX232 is characterized for operation from - 40°C to +85°C for all packages. MAX232 is purposed for application in high-performance information processing systems and control devices of wide application.

4. Power Supply
Microcontroller required 5v dc power supply, We are using is lead acid 12v 1.2Ah battery to achieve this 12VDC is applied to bridge rectifier and filter circuit, then by using fixed regulator IC7805, continuous 5Vdc supply is provided to microcontroller.

5. IC7805
The 7805 three-terminal positive regulator is available in the TO-220/D-PAK package and 5V fixed output voltage, making them useful in a wide range of applications. Each type employs internal current limiting, thermal shut down and safe operating area protection, making it essentially indestructible. If adequate heat sinking is provided, they can deliver over 1A output current. Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain adjustable voltages and currents

4. Software Design and Implementation

A. BER(Bir-Error-Ratio):Receiver can be determines the logic state of each transmitted bit, where BER is the bit error ratio, E(t) is the number of bits received in error over time t, and N(t) is the total number of bits transmitted in time t. Bit error ratio is a statistical parameter. The measured value depends on the gating

time, t, over which the data is collected and on the processes casing the errors.[4,5]

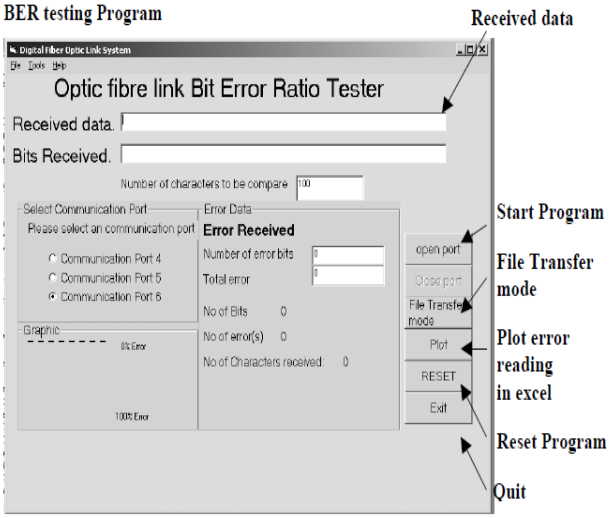

Figure 3: BER tester screen shot.

1) Mickro ICD(In-cjrcuit Debugger):
   mikro ICD is highly effective tool for **Real-Time debugging** on hardware level. ICD debugger enables you to execute a mikroC program on a host PIC microcontroller and view variable values, Special Function Registers (SFR), memory and EEPROM as the program is running
2) USART:
   USART hardware module is available with a number of PICmicros. mikroC USART Library provides comfortable work with the Asynchronous (full duplex) mode. It can easily communicate with other devices via RS232 protocol (for example with PC). We need a PIC MCU with hardware integrated USART, for example PIC16F877.

3) Flash Magic
   Flash Magic is Windows software from the Embedded Systems Academy that allows easyaccess to all the ISP features provided by the device.Flash Magic provides a clear and simple user interface.

5. Conclusion

By using Optical USB Protocol, we can communicate two devices for upto long distances.For its future scope we can use USB hub for the connections of multiple number of computers with each other in star topology so that we can communicate for large distances even upto 10m to 1km.

6. Acknowledgments

The goal of this paper is to design “Optical USB cable using Controlled Fiber Positioning “The function has been realized successfully. I wish to place on record my sincere thanks and whole hearted thanks to my guide Prof. Pagare R. A. under whose supervision this dissertation work has been carried out. It was his keen interest encouraging disposition and full co-operation that has made it possible for me to complete this work. I wish to place on record my sincere thanks and also acknowledge my indebtedness to Prof. Hendre V. S., Head of Electronics & Telecommunication Department, whose critical analysis, careful comments and valuable suggestions have been immense help in completing this work. Lastly, I am thankful to all those persons, who have contributed directly or indirectly in the completion of this project.

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