

HIGHER TECHNICAL INSTITUTE

ELECTRICAL ENGINEERING COURSE

DIPLOMA PROJECT

EXTERNAL MICROCONTROLLER

INTERFACE WITH THE

UNIVERSAL SERIAL BUS (USB)

E 107

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2000

H.T.I

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Project report submitted by:

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In partial of fulfillment of the requirements of award of
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SUMMARY

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EXTERNAL MICROCONTROLLER INTERFACE WITH THE UNIVERSAL SERIAL BUS (USB)

This project deals with the design, and construction of a USB device that has an 8-bit input and an 8-bit output port. It also deals with the communication of the device with a PC Host software that controls the device.

The device is controlled by a PIC16C62A microcontroller from Microchip, which initializes the USB transceiver, handles the input - output requests to the device from the PC Host, reads the data present at the input port, and writes the output data to the output port.

The USB transceiver is a PDIUSB11 from Philips. It handles the USB protocol, and interfaces with the microcontroller via the I²C bus, and an Interrupt.

The host software sends an output report at regular intervals with the output value, and gets an input report that contains the input value. Device drivers are also discussed.

First general information about USB is given, and then the design approach into the project is explained in detail.

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1 Introduction

1.1 Rationale

Universal Serial Bus (USB) is a new technology that was surfaced in 1996, in order to improve the expandability of personal computers, thought overcoming the limits of the traditional serial and parallel port. USB is considered to be a revolution in the computer industry. USB peripheral devices are very popular nowadays. USB devices range from: Keyboards, mice, joysticks, cameras, cd roms, cd writers, hard disks, zip drives, modems, network adapters, printers, scanners, monitors, speakers, microphones, mp3 players and generally all the peripherals that can be connected to a PC. At least two USB ports are found on every new computer, and up to 127 USB devices can be connected to a host, using external USB hubs. It can be forecasted that in a few years time, the traditional serial and parallel ports will cease to exist. USB version 1.1 defines the bandwidth to be 12Mbps for a full speed device, and 1.5Mbps for a low speed device. The forthcoming USB version 2 defines the bandwidth to be 480 Mbps!!!

1.2 Objectives

USB is a very interesting subject. The purpose of this project is to make a simple input output USB device, as well as its interface to the PC Host. The device will have an 8-bit input port and an 8-bit output port. A microcontroller will control the device. On the PC Host side, the software will indicate the value present at the input port of the device, and send an output value to the output port of the device.

This project is going to give the basics of a USB device, so that in the future, somebody else can expand it and build on it. It is the first time that a project on USB is undertaken at the HTI.