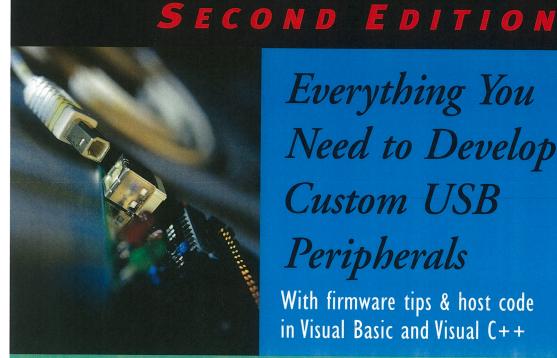
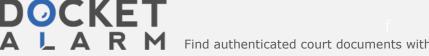
Includes USB 2.0



Everything You Need to Develop Custom USB Peripherals

With firmware tips & host code in Visual Basic and Visual C++

AN AXELSON author of Parallel Port Complete and Serial Port Complete



Find authenticated court documents without watermarks at docketalarm.com.

USB Complete

Everything You Need to Develop Custom USB Peripherals

Second Edition

Jan Axelson

Lakeview Research Madison, WI 53704

A L A R M Find authenticated court documents without watermarks at <u>docketalarm.com</u>.

DOCKET

copyright 2001 by Jan Axelson. All rights reserved. Published by Lakeview Research Cover by Rattray Design. Cover Photo by Bill Bilsley Photography. Index by Broccoli Information Management

Lakeview Research 5310 Chinook Ln. Madison, WI 53704 USA Phone: 608-241-5824 Fax: 608-241-5848 Email: info@Lvr.com Web: http://www.Lvr.com

14 13 12 11 10 9 8 7 6 5 4 3 2

Products and services named in this book are trademarks or registered trademarks of their respective companies. In all instances where Lakeview Research is aware of a trademark claim, the product name appears in initial capital letters, in all capital letters, or in accordance with the vendor's capitalization preference. Readers should contact the appropriate companies for complete information on trademarks and trademark registrations. All trademarks and registered trademarks in this book are the property of their respective holders.

No part of this book, except the programs and program listings, may be reproduced in any form, or stored in a database or retrieval system, or transmitted or distributed in any form, by any means, electronic, mechanical photocopying, recording, or otherwise, without the prior written permission of Lakeview Research or the author. The programs and program listings, or any portion of these, may be stored and executed in a computer system and may be incorporated into computer programs developed by the reader.

The information, computer programs, schematic diagrams, documentation, and other material in this book are provided "as is," without warranty of any kind, expressed or implied, including without limitation any warranty concerning the accuracy, adequacy, or completeness of the material or the results obtained from using the material. *Neither the publisher nor the author shall be responsible for any claims attributable to errors, omissions, or other inaccuracies in the material in this book. In no event shall the publisher or author be liable for direct, indirect, special, incidental, or consequential damages in connection with, or arising out of, the construction, performance, or other use of the materials contained herein.*

ISBN 0-9650819-5-8

DOCKE

Printed and bound in the United States of America

Table of Contents

Table of Contents

Introduction xiii

1. A Fresh Start 1

What USB Can Do 3 Benefits for Users Benefits for Developers It's Not Perfect 11 User Challenges Developer Challenges History 16 The Motivation for Change The Specification's Release USB 2.0 USB versus IEEE-1394

2. Is USB Right for My Project? 21

Fast Facts 21

Minimum PC Requirements The Components

USB Complete

 iii

Find authenticated court documents without watermarks at docketalarm.com.

Table of Contents

Bus Topology Defining Terms What is a Port? The Host's Duties The Peripheral's Duties What about Speed? The Development Process 35 Elements in the Link Tools for Developing Steps in Developing a Project **3. Inside USB Transfers 39** Transfer Basics 40 Configuration Communications Application Communications

Application Communications Managing Data on the Bus Host Speed and Bus Speed Elements of a Transfer 44

Device Endpoints

Pipes: Connecting Endpoints to the Host

Types of Transfers

Stream and Message Pipes

Initiating a Transfer

Transactions: the Building Blocks of a Transfer Transaction Phases

Ensuring that Transfers Are Successful 61

Handshaking Reporting the Status of Control Transfers Error Checking

4. A Transfer Type for Every Purpose 71

Control Transfers 71

Availability Structure Data Size Speed Detecting and Handling Errors **Bulk Transfers 78** Availability Structure Data Size Speed

USB Complete

iv

DOCKE.

Δ

DOCKET A L A R M



Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.